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Second Preface to Volume XXIII

THE HISTORY OF SCIENCE VERSUS THE HISTORY OF MEDICINE

It is a remarkable fact that the history of medicine has been studied more systematically and by a larger number of scholars than the history of any other branch of science. To be sure one should not be unduly impressed by the number of medico-historical studies for a good many of these are not of a high standard. Yet among the thousands of physicians, who, without being trained historians, have managed to save enough time and energy from the demands of an absorbing and exacting profession, many, a good many, have done excellent service and put the republic of letters heavily into their debt. Much work of permanent value can be done by men with no other training than their medical one, plus historical sense and the promptings of a sound conscience and an ingenuous heart. Think for example of the *Life of Sir* WILLIAM OSLER by HARVEY CUSHING (1), a book which will remain a classic of historico-medical literature, and one which later historians will have to consult repeatedly in order to appreciate the medical spirit of our own times.

The recollections of creators, or of their friends and witnesses are almost always historical documents of the first order, but they do not suffice. In addition to such documents we need a whole series of analytical studies, cross sections, horizontal and vertical, and syntheses of many kinds. In order that the history of medicine may be written with increasing accuracy and comprehensiveness, many systematic investigations must be undertaken which are generally beyond the reach of amateurs, and can not be satisfactorily completed except by professional

(1) 2 vols. Oxford, 1925 (*Isis* 8, 358-61).

historians working in institutes where huge collections of books and documents have been patiently and safely accumulated and scholarly traditions established. The model of such institutes (as far as the history of medicine is concerned) is the one organized at the University of Leipzig, by Dr. KARL SUDHOFF, the patriarch of our studies. It is a matter of congratulation for Americans, that thanks to the late Dr. WELCH's wisdom and vision, the Leipzig traditions have now found a new home in the Institute of the history of medicine which is a part of Johns Hopkins University in Baltimore. The transmission of those traditions from Germany to Maryland seems guaranteed by the personality of Dr. HENRY E. SIGERIST, who led the Leipzig Institute before being called to the direction of the Baltimore one.

Strangely enough the one science for which systematic efforts of a similar kind have been made is the one which is so-to-say at the intellectual antipodes of medicine,—mathematics. Thanks to the energy and life long devotion of MORITZ CANTOR (1829-1920), an historico-mathematical tradition was begun at the University of Heidelberg. CANTOR's *Vorlesungen* have never been equalled in learning, order, and massiveness (e.g., no history of medicine does even begin to compare with them), yet there is no institute for the history of mathematics as well organized as the institutes for the history of medicine existing in Leipzig, Baltimore and various other places. There are excellent mathematical libraries such as the the MITTAG-LEFFLER institute near Stockholm, the DAVID EUGENE SMITH library in New York, the Chancellor CHACE and ARCHIBALD library in Providence, Rhode Island, and others, but these precious tools are not used as systematically as they should. An Institute consists of a staff of experts, using the apparatus criticus (2) bequeathed to them by earlier colleagues and gradually enriched by themselves, and following definite traditions of scholarship subjected to continuous selection and improvement. The men come first to be sure, but the best men cannot do their best without a very elaborate equipment, the preparation of which implies the uninterrupted devotion of many generations. The succeeding scholars do not

(2) That is, not only books and pamphlets the likes of which may be consulted in other libraries, but archives, every item of which is generally unique.

gradually improve—the earlier ones may be better than their successors—but their equipment becomes better and richer and their traditions, more exacting.

How shall we account for the lack of institutes for the history of science, which be at all comparable to the medico-historical institutes? How shall we account for that glaring discrepancy? Easily enough. The very reasons which explain the unpopularity of the history of science will also explain the relative popularity of the history of medicine. We shall not discuss to what extent medicine deserves to be called a "science," for it is certain that, however scientific it be or may become, it is also and will always remain an "art"—an art which can leave no man, whether sound or sick, indifferent. It may be difficult to make a layman realize the humanity of science, of mathematics, but the humanity of medicine needs no demonstration. The good physician, the healer, is man's best friend, and perhaps even more so in our irreligious days, when the priest or domine has fewer opportunities than before of extending his own kind of help to those who suffer, and when the doctor on the contrary has learned the ways of alleviating mental distress as well as physical pain.

I do not begrudge the historian of medicine his popularity but rejoice in it. I only begin to object when he overreaches himself and tells us or seems to tell us that after all the history of medicine is the best part of the history of science. Such an attitude would be incomprehensible to non-physicians if they did not remember that the medical profession was not only the largest scientific profession (and has remained by far the largest to this day), but that it was almost the only one until comparatively recent times. To be sure there were mathematicians, astrologers, mechanicians, alchemists, but their numbers were comparatively small and not a few of them were M.D.s. Down to the sixteenth century a learned man was doctor of medicine or else a doctor of divinity or of law. Of course, then as now, some of the very best men—genuine inventors and creators—did not think it worthwhile to encumber themselves with academic sheepskins. But if he cared for that sort of thing and had any scientific proclivities, he became an M.D. as a matter of course, and in many cases he actually practised the medical profession. As far as the natural sciences are concerned, a similar situation obtained until

well into the nineteenth century. The chances of earning a livelihood as a naturalist pure and simple were very small; thus a boy lacking private means but possessed with an instinctive and irrepressible fondness for natural history, would try to obtain a medical degree in order that he might be sure of his daily bread, and his real work would become the avocation of a medical career. One might say that medicine was the mother of all sciences, not only because the needs of healing were among the strongest inducements to the search of knowledge, but because the lovers of science could not be sure of a living without becoming the servants of Asclepios.

A biographical dictionary of physicians would necessarily include a large proportion of the men who achieved distinction in diverse scientific fields, but it does not follow, as some doctors seem to assume, that a history of medicine would in itself suffice to explain the development of science. That history would refer to many illustrious scientists, though not to the most illustrious ones—such as NEWTON, EULER or GAUSS—or if it named them at all it would have nothing significant to say about them, nothing to illustrate and prove their greatness. As the medical art applies to its own purposes every physical, chemical or biological discovery which is at all applicable, the historian of medicine must necessarily mention these discoveries; for example, he cannot help introducing into his narrative, suitable if brief accounts of the discovery of such instruments as the thermometer, the polariscope, the manometer, the X-ray apparatus and many others, and hence the belief that his history is essentially a history of science, including all that is truly worthwhile, would obtain gradually more credit.

However that belief would be doubly mistaken; in the first place, because the immense majority of scientific discoveries have no medical applications and thus would remain completely unnoticed; in the second place, because even the discoveries which are of medical importance can only be dealt with in a very superficial way. No historian of medicine will attempt to explain the very complicated genesis, development, and ramifications of those discoveries, for this would break the pattern and unity of his own work and put his main story entirely out of focus. He cannot interrupt his account at every corner in order to describe minutely a gigantic tree for the sake of the few medical twigs which belong to it.

When he speaks of ROENTGEN's wonderful invention or of such an instrument as the electrocardiometer, he cannot begin to analyze the thousands of steps, and of right and false movements, which gradually led to them. If he did that he would be writing the history of science, or at least a part of it, but his book would no longer be a history of medicine.

The scientific humanist who criticizes the conventional historian for his neglect of the main features of human evolution could make almost the same reproach to the historian of medicine (though it would hardly be fair inasmuch as the latter has his own very definite task to accomplish). The history of science should form the core of every history of humanity because the elements which it describes and discusses are the ones which reveal most clearly the rational, progressive and cumulative tendencies and explain in the best manner the function and purpose of man in the general scheme of things. In a similar way one could prove easily that the core of the history of science should not be the history of medicine but the history of mathematics and mathematical sciences, the other branches of science being dealt with in the order of their mathematical contents, the most mathematical first, the least mathematical, last. Even as the fundamental explanation of the universe, as far as any is possible, is necessarily mathematical and cannot even be uttered in non-mathematical language, even so the fundamental explanation of human progress must necessarily be focussed upon the history of science, itself focussed upon the history of mathematics. Indeed the average physician, though he may have extensive and accurate information on special subjects, is condemned to live in a world of which he can see only a small part and of which he is unable to form any clear and comprehensive idea.

A history of science focussed upon the history of mathematics can never be as popular as the history of medicine, because of its esoteric and forbidding nature. The human implications of medicine are obvious enough; on the other hand, mathematics (to go to the other extreme) is frigidly objective and apparently inhuman. Yet the history of science provides a truer picture of the total reality—as far as man can grasp it at all—the reality of the universe and himself within it, not simply the surface of reality but its flux and depth.

Mathematics form the very core of human thought, and hence of human life, but it is a *secret* core. When the development of mathematical knowledge and wisdom is well understood, one can examine other developments from the inside out, and thus one can see them in their complicated interdependence and their harmonious totality, while the historian of medicine is reduced to consider those scientific developments so-to-say from the outside in, that is, superficially, without possibility of appreciating their manifold relationship and hidden unity.

There is much more to be said for the mathematical approach to human history, or what might be called mathematical humanism, but it is not possible to be at one and the same time clear and brief. Let me just add this : whatever knowledge and understanding we have of infinity we owe to mathematicians. As opposed to the doubtful and uncommunicable knowledge which some mystics claim to possess on the subject, the mathematical knowledge of infinity is, as far as it goes, certain, objective, verifiable. It is naturally esoteric and difficult, yet communicable to every person who has enough patience, humility, honesty and intelligence to follow the right path step by step.

Not only does mathematics approach the understanding of infinity in the only sensible way, but also it is essentially (as HERMANN WEYL put it) the science of infinity. Historians of medicine, if they think of mathematics at all, think only of their applications. From the purely mathematical point of view, these applications however valuable they may be otherwise, are only the by-products of a different purpose. That purpose is purely intellectual, aesthetical, disinterested. It is a great joy to the mathematician, comparable only in its purety and fervor to religious ecstasy, to discover and enjoy the pattern, the rhythm, the harmony of the cosmos in the deepest way that such mysteries can be appreciated at all. The mathematical understanding of infinity is limited and imperfect, but it is perfectible, and it is neither erratic nor vague. It is objective and is always communicable to those who have been properly initiated and have patiently learned the unequivocal use of special terms and symbols and the faithful application of right methods.

The physician knows better than anybody else man's body, and to some extent his spirit, the mechanism of it; he knows

mind and body in their healthy state and also their aberrations and diseases and is often able to cure or alleviate the latter; his knowledge of man is thus very intimate, and yet he does not and cannot know the essential, for he cannot understand the world and man's place in it,—the world's signification, man's signification. This is left to the mathematician, that is, to the mathematical physicist. For the latter, man is only an abstract unit in the general scheme of things, but he can understand that scheme better than anybody else, in fact better than the non-mathematician can even conceive to be possible. That understanding I repeat is very limited, but such as it is, it is immeasurably superior to that obtainable in any other way. To borrow a distinction initiated by PLATO and which dominated mediaeval philosophy, physicians study the microcosmos, physicists, the macrocosmos, that is, the universe and man's relationship to it.

The history of mathematics is very interesting in itself, in a deeper way than the history of science (without mathematics or with but little of it) can ever be. For mathematics reaches out on the one side toward the infinite, the ineffable, and on the other side toward the gratification of man's humblest needs. When our prehistoric ancestors had to solve the simple problems suggested by their crude environment,—for example, the ordering of their calendar, the decoration of their altars and homes, the enumeration and division of their herds and other chattels, they were beginning to develop mathematical knowledge and methods, and they were thus led gradually to the formulation and solution of other problems of increasing complexity and abstraction.

However the most interesting survey is provided not by the history of mathematics alone but by the history of science focussed upon it, and by the history of humanity focussed upon the history of science. Any philosophy of science which is not a mere rhapsody must take that survey into account, for without it there can be no historical perspective, no perspective at all, no human experience, and one's conclusions cannot but be dogmatic, untried, incomplete and superficial.

To conclude, it is not possible to exaggerate the interest and importance of the history of medicine, but the historian of medicine who imagines that he is *ipso facto* a historian of science, is laboring under a gross delusion. However elaborate the history of medicine

may be and however excellent of its kind, considered as history of science, it is essentially incomplete and misleading,—it is like the play of Hamlet with Hamlet left out.

Happily many physicians and historians of medicine know better and no longer make such preposterous claims. A growing number of them are becoming more and more interested in the history and in the philosophy of science, witness the very respectable group of physicians who are faithful members of the History of Science Society, read *Isis*, and even contribute to its volumes. The time is approaching when the history of science will receive the recognition it deserves and be as warmly supported as the history of medicine by the scientific and medical elite, as well as by an increasing number of historians and philosophers.

Snäckgärdsbaden, Visby, Gothland. GEORGE SARTON.

July 20, 1934.

Thirty-three clinical observations by Rhazes (circa 900 A.D.) [1]

A. — The Biographers of Rhazes

It is a singular fact that so little is known about the life of Abū Bakr Muḥammad ibn Zakariyyā' ar-Rāzī (Rhazes), the greatest physician of the Islamic Period. Those of his works which were translated into Latin, particularly his treatise " On Smallpox and Measles," established his reputation as an excellent observer and at the same time a critical compiler of Greek, Syriac and early Arabic medical knowledge. Neuburger, in his excellent *History of Medicine* (2), was very sound in his judgment when he said that Rhazes was without doubt the greatest of the very few

(1) Bibliographical references :

Ahmed Issa Bey, *Histoire des Bimaristans (Hôpitaux) à l'époque islamique*. Le Caire, 1928.

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Ibn Abī Uṣaibi'a (I.A.U.), *'Uyūn al-Anbā' fī Ṭabaqāt al-Aṭibbā'*, (" Sources of Information on the Classes of Physicians "). Cairo, 1882, 2 vols.

Ibn al-Qifṭī, *Ta'rīkh al-Ḥukamā'* (" History of Learned Men "). Ed. J. Lippert, 1903.

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Ruska, J., Al-Bīrūnī *als Quelle für das Leben und die Schriften al-*Rāzī's. *Isis*, vol. V (1923), pp. 27-50.

Sarton, George, *Introduction to the History of Science*. Vol. I, 1927.

H. E. Stapleton and M. Hidayat Ḥusain, *Chemistry in 'Irāq and Persia in the Tenth Century A.D.* Memoirs of the Asiatic Society of Bengal, VIII (Calcutta, 1927), pp. 316-417.

(2) Neuburger, Max, *Geschichte der Medizin*, vol. II (Stuttgart, 1911), p. 167 et seq.

physicians of the Islamic Period who found their way to HIPPOCRATES and the inestimable value of unbiassed clinical observation. The present publication will, I hope, confirm NEUBURGER's views. I now venture to offer the testimony of a direct translation from one of RHAZES' original texts.

The first author to write about RHAZES was IBN AN-NADĪM (3), in his Literary History *al-Fihrist*, compiled in 987 A.D. He gives no dates, is very brief and merely mentions the great numbers of the Master's pupils and also his alleged blindness towards the end of his life. He then gives a very extensive bibliography but without any order of sequence. In this list, early as it is, there are already blunders and several works are mentioned which undoubtedly are only ascribed to RHAZES.

Not long ago J. RUSKA published the German version of a bio-bibliographical sketch on RHAZES (4), written about a century after his death by ABU'R-RAIḤĀN MUḤAMMAD AL-BAIRŪNĪ, the greatest physicist and astronomer and one of the most original thinkers of the Muḥammadan world (he lived about 975-1050 A.D.). This very exact chronologist asserts that RHAZES was born on the first day of the Arabic month of Sha'bān, 251 A.H. (August 27, 865 A.D.) at Rayy (Rhages in Ṭabaristān, North Persia), and died there on the fifth day of Sha'bān, 313 A.H. (October 26, 925 A.D.). If AL-BAIRŪNĪ is right, RHAZES furnished an enormous output of work during a sixty years' span of life. The biographer proceeds to speak contemptuously of RHAZES' philosophical and theological opinions, and adds a few notes on his activity as physician and clinical teacher. But he fails to give any detailed account of RHAZES' life. Instead, he gives a very important catalogue of RHAZES' scientific output, arranged according to subject.

IBN AL-QIFṬĪ (d. 1248 A.D.) also gives a very short note on RHAZES' life (5). According to him, RHAZES was for the first half of his life a musician. He later took to Medicine, and was appointed director of the Hospital *(māristān)* in his native town, Rayy, and afterwards in Baghdad. If this author is to be credited,

(3) IBN AN-NADĪM, I, p. 299.

(4) RUSKA, pp. 27-50. An English translation of a part of it is found in STAPLETON, p. 319-20.

(5) IBN AL-QIFṬĪ, pp. 271-277.

RHAZES died about 320 A.H. (932 A.D.) : we think, however, that the date given by AL-BAIRŪNĪ is more likely to be exact.

IBN ABĪ UṢAIBI 'A (d. 1270 A.D.) wrote the most comprehensive biography and by far the most extensive bibliography of RHAZES, partly based on the above-mentioned sources (6). He corrected some of the grave chronological errors committed by former historians. Nevertheless, he thought, with IBN AL-QIFṬĪ, that the North-Persian physician, 'ALĪ IBN RABBAN AṬ-ṬABARĪ was RHAZES' teacher. We proved, on the contrary (7), that this well-known practitioner and scholar must have died before RHAZES was born. Another error, which is not accepted by I.A.U., is the story that RHAZES was requested to choose a site for the 'Aḍudī-Hospital in Baghdad and was appointed its director, whereas in fact the hospital was founded by Prince 'AḌUD AD-DAWLA in 980 A.D.—more than half a century after RHAZES' death ! (8). I.A.U. thinks that RHAZES was given charge of the hospital which existed before the time of 'AḌUD AD-DAWLA, and this hospital may perhaps have served as a model for the latter's creation. RHAZES wrote a record of observations at that hospital, which must have been, in my opinion, the Muqtadirī-Hospital, founded in Baghdad in 306 A.H. (918 A.D.) by order of the Caliph AL-MUQTADIR BI'LLĀH (9). I.A.U. tells, moreover, several stories of a more anecdotic character about the medical skill and insight of RHAZES. They have been reproduced in French by LECLERC (10). Then follows a very long bibliography of about 230 works due to RHAZES' pen. I.A.U., like previous biographers, fails to give any details concerning RHAZES' life.

So also does the last of RHAZES' prominent biographers, IBN KHALLIKĀN (11), who died in 1282 A.D. His account of RHAZES'

(6) IBN ABĪ UṢAIBI'A, I, pp. 309-321.

(7) MAX MEYERHOF, 'ALI IBN RABBAN AṬ-ṬABARĪ, *ein persischer Arzt des 9. Jahrh. n. Chr.* Zeitschr. d. Deutschen Morgenländ. Gesellsch. X (1931), pp. 38-68.
The same. 'ALI AṬ-ṬABARĪ's " *Paradise of Wisdom*," *etc.* *Isis*, XVI (1931), pp. 6-54.

(8) AHMED ISSA, p. 181 et seq. Compare, moreover, G. LE STRANGE, *Baghdad during the Abbasid Caliphate*. Second edition (London, 1924), p. 62.

(9) It is probable that RHAZES lived in Baghdad during the long reign (908-932 A.D.) of this Caliph.

(10) *Histoire*, vol. I, p. 337 et seq.

(11) *Wafayāt al-A'yān*, ed. BŪLĀQ, 1275 A.H. Vol. I, p. 103 et seq.

life is still shorter, with some digressions on the subject of other doctors and the princes with whom RHAZES is said to have been in relationship.

There is no doubt that much biographical material can be extracted from RHAZES' most important work, of which we shall treat in the following chapter.

B. — REMARKS ON RHAZES' *Continens*

RHAZES' best-known work is his " On Smallpox and Measles," which has had the honour of about a dozen translations into Latin and modern languages. Of it NEUBURGER says : " It ranks high in importance in the history of epidemiology as the earliest monograph upon small-pox, and shows us RHAZES as a conscientious practitioner, almost free from dogmatic prejudices, following in the footsteps of HIPPOCRATES." Next in importance comes the *Kitāb aṭ-Ṭibb al-Manṣūrī* (" The Book of Medicine dedicated to MANṢŪR ") (12), known to the Latin Middle Ages as *Liber Almansoris* and edited in many Latin printed texts. It is a short, practical textbook of Medicine, and its ninth part *(Liber Nonus)* enjoyed great repute and formed the basis of medical learning until late in the sixteenth century (13).

We omit mention of RHAZES' minor medical treatises, as well as of his many writings on medical ethics. We recommend particularly the study of his short treatise " On the Reason for which the Hearts of most People turn away from honest Physicians", translated by STEINSCHNEIDER (14).

Of all the many works of RHAZES by far the most voluminous is " The Comprehensive Book of Medicine " *(Kitāb al-Ḥāwī fi't-Ṭibb)*. This book has never been published in the original Arabic text which should comprise about twenty-four volumes. There is, however, no complete copy in existence, while the volumes extant, about twelve in number, are widely dispersed

(12) This was the Sāmānid Prince ABŪ ṢĀLIḤ MANṢŪR IBN ISḤĀQ, Governor of the Eastern and Southern provinces of Persia, killed in 302 A.H. (925 A.D.).

(13) See SARTON, *Introduction*, Vol. I, p. 609 et seq.

(14) VIRCHOW's *Archiv*, vol. XXXVI, pp. 570-586.

in European libraries. The Escorial Library near Madrid has five volumes, and in the uncatalogued Libraries of Istanbul and its vicinity there may be still more of them. I, myself, was recently able to buy fragments of about five other volumes. It is certain that the book, on account of its size and price, was always very rare, and it seems that at certain periods there were not more than two copies of it available in the entire Muḥammadan world. All RHAZES' biographers agree that he left this work unfinished, and that it was partly arranged by his pupils after the master's death (see below). A Latin translation was made, in Sicily or at Naples, by the Jewish physician and translator, FARAJ IBN SĀLEM (called FARRAGUTH) for King CHARLES OF ANJOU. This work, which must have taken nearly the whole lifetime of the translator, was completed in 1279. It was printed at Brescia in Northern Italy in 1486 A.D., and forms the most bulky of all the incunabula, its two volumes weighing more than twenty pounds. It was reprinted several times during the XVIth century, but all the editions are rare. In the printed edition, RHAZES' work is divided into 25 books. It is not known from what Arabic MS. the translation was made.

The contents of the *Continens* is an encyclopaedia of therapeutics, comprising much special Pathology but excluding Anatomy. There is no doubt that the author throughout his life made extracts from all the medical works of Greek, Syriac and Arabo-Persian writers, probably in the form of a loose-leaf index, and later collected the material in the various parts of his book, in which he treats of the diseases of the body " from top to toe." After having quoted many former authorities, he usually adds a special chapter under the heading *Mine* or *my own (lī)*, in which he states his own experience and opinions. For this reason the book is, on the one hand, a huge and indigestible mass of literature, often lacking unity of plan and finish; but, on the other hand, it is an invaluable record of quotations from several hundreds of only partly known or completely forgotten writers whose works are lost, not to mention the value of so many early Arabic translations from known Greek medical writers whose texts are available in Greek alone through late Byzantine MSS. More than all this, we are bound to admire the learning, acuity, observation and the often surprisingly sound judgment of RHAZES himself

in his personal notes and comments. From these notes, there could be extracted an important record of his medical activity, as well as of his clinical considerations on all the diseases known to the physicians of that remote period. But this task would mean a labour of many years and a thorough knowledge of RHAZES' Arabic style and of Greek and Persian Medicine. In medical theory, RHAZES was a pupil of GALEN, but in practical observation and therapy a pure Hippocratist. An alchemist of renown, he often tried treatment with new chemical preparations which were unknown to his forerunners.

Before we proceed to an examination of some clinical notes in the *Continens*, I shall give translations of the very interesting information given by Muḥammadan physicians regarding the plan and the circumstances of the publication of this immense compilation.

The earliest of these physicians is the Persian, 'ALĪ IBN AL-'ABBĀS, surnamed " the Magus " (d. 994 A.D.). He must have been born about the time of RHAZES' death. He practised for some time at Baghdad and dedicated his main work, " The Perfect Treatise of the (Medical) Art " *(Kāmil aṣ-Ṣinā'a)*, or " The Royal Book " *(Al-Kitāb al-Malikī)* to the mighty Sultan 'AḌUD AD-DAWLA, the real ruler of the East in the place of the weak Caliphs. This " King of Kings " is known to have been a friend of poets, writers and scientists, and to have founded, in 880 A.D., a famous hospital at Baghdad, to which we have referred in the foregoing pages. The Introduction of 'ALĪ's book—which is the first and perhaps the best complete treatise on Medicine as a whole—begins with a review of the medical treatises of former times written in Greek and Syriac, and then continues with the Arabic works. Most of this introduction is available in LECLERC's translation (15) from the Arabic original. I shall give here a new translation of that part which speaks of RHAZES' two most important general treatises on Medicine. 'ALĪ (16) writes as follows :

" Concerning MUḤAMMAD IBN ZAKARIYYĀ' AR-RAZĪ, he composed his book known as *al-Manṣūrī*, in which he treated, in the form

(15) *Histoire de la médecine arabe*. Vol. I, pp. 383-388.
(16) BŪLĀQ edition of the work (Cairo, 1293 A.H.) Vol. I, p. 5.

of summaries, of the medical art. He did not omit anything of indispensable matters, save that he did not provide explanations of his sayings but proceeded in the way of abbreviation as this was his aim."

" As to his book which is known as " The Comprehensive " *(Al-ḥāwī)*, I found that he mentions in it everything the knowledge of which is necessary to the medical man, concerning Hygiene and medical, as well as dietetical, treatment of diseases and their symptoms. He did not neglect the smallest thing required by the student of this art concerning treatment of diseases and illnesses; but he made no mention at all of natural (physiological) matters, such as elements, temperaments and mixtures [of the humours]; nor did he speak of anatomy and surgical treatment. He wrote, moreover, without order and method, neglecting the side of (scholastic) learning; he omitted to sub-divide his book into discourses, sections and chapters, as might have been expected from his vast knowledge of the medical art and from his talent as a writer. Far be it from me to contest his excellence or to deny his knowledge of the medical art and his eminence as an author ! Considering this condition or imagining the causes of it by comparison with the vast knowledge shown in this book, I think there are two possibilities : either he composed it and collected in it the entire field of Medicine as a special memorandum of reference for himself, comprising Hygiene and Therapeutics, for his old age and the time of forgetfulness : or being afraid of damage which might occur to his library, which was to be made good (in this case) by the book in question. Likewise in order to relieve his writing from bulkiness and in order to be useful to the people and to create for himself a good memorial for coming generations he provided reference notes for his entire text, put them in order and compared each one with its like and fitted it in its chapter according to his knowledge of appropriateness in this art. In this way the book should be complete and perfect."

" He was, however, prevented from continuing it by hindrances(17), and death befell him before its completion. If such was his aim, he treated his subject at too great length and made his book too voluminous without any urgent necessity to claim in his

(17) Probably blindness by cataract which overtook RHAZES in his advanced age.

favour. This was the reason why most scholars were not able to order and purchase copies of the book, except a few wealthy literary men, and so copies are scarce. He proceeded in such a manner that for each disease, its causes, symptoms and treatment, he mentioned the sayings of every ancient and modern physician on the disease in question from HIPPOCRATES and GALEN down to ISḤAQ IBN ḤUNAIN (18), and all the physicians, ancient and modern, who lived in between them, without omitting the sayings of any one of them and reference to them in this book, so that the entirety of medical literature was comprised in this book. You must know, however, that skilful and experienced physicians agree about the nature of diseases, their causes, symptoms and medical treatment, and that there exists no marked difference between their opinions, except that they treat more or less of the matter and that they speak in different terms, because the rules and the schools they follow in the knowledge of diseases, their causes and treatment, are obviously the same. If this is so, it was not necessary to record the sayings of [all] the ancient and modern physicians and the reiteration of their utterances since they all repeat the same things..."

"It was necessary, and I would not blame him if he had done so, to confine himself to some of their sayings and to limit the quotations to the strictly necessary and to those writers who were the most excellent, occupying the first rank in the [medical] art and the best and most experienced among them. In this way it would have been easier for scholars to acquire and to copy the book which would have been relieved of its excessive length and bulk, so that it would have been spread among the people and would be more easily available; whereas, as far as I know, copies of it are now in the possession of a few literary and scientific men only."

This last statement perhaps supplies an explanation of why there is in our days no complete copy of the book in existence.

The second record is a story of how the book came to be published, told by IBN ABĪ UṢAIBI'A, the famous author of the *History of the Arabic Physicians*. He lived in the XIIIth century,

(18) The son of the famous translator, ḤUNAIN IBN ISḤĀQ: he was RHAZES' contemporary.

but he quoted an account given by a Christian physician who lived two centuries earlier. This is 'UBAIDALLĀH IBN JIBRĀ'ĪL IBN 'UBAIDALLĀH (one of the last descendants of the celebrated Syriac medical family of BOKHTYESHŪ') (19), who wrote a biographical work which is lost and only known from IBN ABĪ UṢAIBI'A's quotations. IBN ABĪ UṢAIBI'A says (20) :

" 'UBAIDALLĀH IBN JIBRĀ'ĪL said the following : ABŪ BAKR MUḤAMMAD IBN ZAKARIYYĀ' AR-RĀZĪ possessed great dwellings in Rayy and the other towns of al-Jabal (21). He said moreover : He lived until he was met by IBN AL-'AMĪD (22), the teacher of AṢ-ṢĀḤIB IBN 'ABBĀD (23). He was the cause of the publication of RHAZES' book which is known as " the Comprehensive " *(al-Ḥāwī)* for he happened to be at Rayy after RHAZES' death and asked for the book from ABŪ BAKR's sister and offered her large sums of money until [at last] she showed him the materials for the book. Thereupon he assembled the doctors, his (RHAZES') pupils, who were still in Rayy, and caused them to put the book in order : in this way it was edited in its present disorderly condition."

This narrative, although written by a scholar at Baghdad two centuries after RHAZES' death, states what was very probably the case. When studying parts of the *Ḥāwī*, one has the distinct impression that the book is unfinished and merely a collection, arranged without order, of loose sheets. Sometimes parts of the text are not in the right place, and we shall remark this even in the short text of which a translation follows below.

(19) See LECLERC, vol. I, pp. 99-103 and 370-4.

(20) I.A.U., I, p. 314, line 13 et seq.

(21) This name, meaning " the Mountain," is here applied to the mountainous districts of North Persia (Ṭabaristān, etc.) south of the Caspian Sea.

(22) This is ABU'L-FAḌL MUḤAMMAD IBN ABĪ 'ABDALLĀH AL-KĀTIB (" the Secretary "), who was appointed vizier of the Persian ruler, RUKN AD-DAWLA, in 939 A.D., and died after an adventurous life about 960. He was not only a statesman and warrior but also a renowned scholar. See *Encyclopaedia of Islam*, II, 360.

(23) ABU'L-QĀSIM ISMĀ'ĪL IBN 'ABBĀD AṬ-ṬĀLAQĀNĪ was pupil, secretary and successor as vizier to the above statesman, and received the title *Ṣāḥib* (" companion ") on account of his close relations to IBN AL-'AMĪD. He held office as vizier a long time and died in Rayy in 995 A.D. He was famous as a man of learning, as a lover of philosophy and as a protector of the arts and sciences.

C. — A Text containing Clinical Observations

The great orientalist, the late Edward Granville Browne, in his wonderful *Arabian Medicine* (24), drew the attention of medical historians to a hitherto unknown text (folios 239 *b* — 245 *b* of MS. *Marsh* 156 in the Bodleian Library at Oxford) containing some clinical observations by Rhazes. The MS. volume should comprise the seventh book of Rhazes' *al-Ḥāwī (Continens)*, but the identification is uncertain according to Browne's own statement. I regret that I have not been able to compare its contents with my own MS., which has long fragments from the seventh book. The twelve pages of MS. *Marsh* give a very interesting account of thirty-three clinical cases, apparently from Rhazes' own notebook. They are missing from the Latin translation as I am informed by Dr. Paul Kraus (of Paris), to whom I am indebted for the search he made for me in one of the editions of the *Continens*.

Browne himself said " that it is as a clinical observer that Rāzī excels all his compeers; and since the clinical notes of these old ' Arabian ' (25) physicians are of much greater interest and importance than their obsolete physiology and pathology or their second-hand anatomy, a careful study of the works of Rāzī, especially of his great *Ḥāwī* or " Continens," is probably the most repaying field to which the Arabic scholar interested in Medicine can devote himself." This encouraged me to undertake the edition and translation of the following observations, the first of which was given in Arabic, with an English translation, by Professor Browne himself. As to the others, he stated that " they are not easy to understand, the Arabic text being represented by one manuscript only, and the style, apart from apparent scribe's errors, being crabbed and technical." I have to add that the copyist was a rather ignorant Persian, perhaps not even a medical man, who misunderstood the meaning of the text in many places. To restore and rectify the text, I needed the help of an orientalist, and this was offered me in the most generous way, as often before,

(24) *Arabian Medicine*, pp. 48-53.

(25) Inverted commas, because they were frequently Arabic-writing Persians, Turks or Berbers, but not Arabs.

by my friend, Professor JOSEPH SCHACHT, the well-known Arabic scholar of Koenigsberg (now Cairo) : I take great pleasure in thanking him here for his invaluable collaboration.

As I have had no opportunity of examining the complete Oxford volume of the *Ḥāwī*, I have not been able to form an idea of where the following cases have been interpolated by the editors of the deceased master's main work. This is of minor importance as they seem to have been independent of the other parts of the book and are merely " illustrative accounts " to be compared with observations by HIPPOCRATES, the venerated master of all the physicians of the Greek and Islamic period. It is probable that they served RHAZES for the purpose of lectures in Rayy, where he had many pupils right up to the end of his life. We read, indeed, in AL-BAIRŪNĪ's biographical sketch of RHAZES (26) the following passage : " He (RHAZES) was continuously studying, and he had a great number of followers (pupils). He used to put his lamp into a niche in the wall, to stand opposite it and to rest his book against the wall so that it should fall from his hand and wake him up if he were overpowered by sleep and cause him to resume his duty (i.e. lecture)." AL-BAIRŪNĪ then concludes that RHAZES' abuse of his sight by eager study may have been a contributory cause of the cataract from which he suffered at the end of his life (27).

RHAZES says, moreover, that he has chosen his cases without any special rule, and so we see, in fact, that they are varied, of different nature, and concerning internal and ocular diseases and women's maladies. They were intended to be read in parallel with cases from HIPPOCRATES' *Epidemic Diseases*, but RHAZES, himself, gave only one such parallel observation, and this is not in its right place. It follows Case 27 with which it has no connexion, whereas it should have been placed, perhaps, after Case 28 or 33. It seems also that the critical quotation from the *Epidemics* made by RHAZES is not complete, because a marginal note remarks : " Remainder of the Section on the *Epidemics* by this great scholar."

(26) RUSKA, p. 32.

(27) Here STAPLETON (p. 320 line 7 from the bottom) made a mistake by translating " his eyes were always watering." " Water " *(mā')* in Arabic is the term for *cataract*.

We now give the translation of the 33 complete and one incomplete cases, hoping that in the future another MS. of this interesting passage will enable us to verify the uncertain parts of this first publication of RHAZES' clinical observations. The numbering of the cases and their *en-têtes* are mine.

[*fol.* 239 *v.*]
In the name of Allah, the Merciful, the Compassionate !

Illustrative Accounts of patients and our own clinical histories, only a mixed record of unusual cases which find their place here on account of their relation to questions and narratives contained in [HIPPOCRATES'] *Epidemics*. We do not want to delay or postpone this any longer because it is a very useful discussion, particularly on account of the questions raised in it. We had [hitherto] neglected these examples because we intended to collect them all together here. According to this, our intention, we must place the *Epidemics* beside these questions, read them side by side, and write them down here as completely as possible—if Allāh will !

[*Case I : Renal Abscess, Perforating into the Renal Pelvis.*]

'ABDALLĀH IBN SAWĀDA used to suffer from attacks of mixed fever which overtook him sometimes every six days, sometimes like a tertian, quartan or quotidian. They were preceded by a slight rigor, and micturition was very frequent. I gave it as my opinion that either these accesses of fever would turn into quartan, or that there was an abscess *(khurāj)* (28) of the kidneys. Only a short while elapsed before the patient passed pus in his urine; I informed him that these feverish attacks would not recur, and so it was.

The only thing that prevented me at first from giving it as my definite opinion that the patient was suffering from an abscess of the kidneys was that he had previously suffered from tertian and other types of fevers, and in this the (my) opinion that this mixed fever might be due to inflammatory processes, which would tend to become quartan, was strongly supported. Moreover, the patient did not complain to me that he felt in his loins, when

(28) BROWNE translates by " ulcer," but the Arabic name of this is *qarha*.

standing, as it were a weight hanging from him; and I had neglected to ask him about this. The frequency of micturition should have strengthened my suspicion of an abscess in the kidneys, except that I was unaware of the fact that his father suffered from weakness of the bladder and was subject to this complaint, and that he, himself, had suffered from it when he was healthy. It is, therefore, our duty to avoid lack of solicitude with the utmost possible care—if Allah will!

When he passed the pus in his urine, I administered to him diuretics until the urine became free from pus. After that, I prescribed to him *terra* [*fol.* 240 *r.*] *sigillata*, incense and dragon's blood (28*a*); his malady departed from him, and he was completely and quickly cured in about two months. That the abscess was small, was indicated to me by the fact that he did not complain to me at the first of a weight in the loins. After he had passed pus, however, I inquired of him whether he had experienced this symptom, and he replied in the affirmative. Had the abscess been extensive, he would of his own accord have complained of this symptom; and the rapid evacuation of the pus showed the small volume of the abscess. Other physicians, however, (whom he consulted beside myself) did not understand his case at all, even after the patient had passed pus in his urine.

[*Case II:*] The Story of 'Ilk, the Accountant. [*A bilious Dysentery*].

'Ilk, the accountant, consulted me and complained of colics, without giving an exact description. I advised him to take tamarinds; he did it and the pain subsided. Some time after, the pain in his bowels returned during several days, with constipation. This was followed by a dysentery *(saḥj)*, caused by a black-biled mixture [of humours], and he died from it while he was far from me (or, during my absence).

Therefore it is important to know that sometimes people are attacked by a violent pain in the bowels, arising from an ill-natured bile which flows into their intestines and so generates a kind of colic and leaves traces. After this, they are easily

(28*a*) A kind of blood-red resinous secretion exuded from the fruits of certain tropical palm-trees (Daemonorops, etc.)

subject to malignant dysentery, particularly people of black-biled constitution. Such was the case of this 'ILK.

[*Case III:*] The Story of IBN 'AMRAWAIH. [*Otitis followed by Meningitis.*]

He was a man who was inclined to have meningitis *(sirsām)* and he had suffered from this disease before my arrival. He was, however, cured of it by the escape of the superfluity (discharge) into the ear with subsequent formation of fistulae in it after phlebotomy. Thereafter this suppuration in his ear became chronic owing to inadequate medical treatment. Therefore when the suppuration became deep-rooted later in his aural cavity, it gave rise to a... *(caret)* ... as we are used to do it in the phlebotomy in order to cause the breaking out of the abscess in the interior of the ear in the event of the ulceration becoming chronic in the ear. The abscess burst, in fact, in the interior of the ear, and was cured by treatment. There remained, however, some residue of ill-natured humours in the patient because he had not been cured of his first disease by energetic evacuation [*fol.* 240 *v.*] and because the matter had turned into the ear. Thereupon he ate sheep's-head and grapes in excessive quantity, after which he got a continuous fever; he became disturbed, meteoric and of dry temperament. He took fruit-juice and gentle purgatives, but he vomited them.

I went to see him on the third day; I found him suffering from a violent headache, photophobia, strong lacrymation and red eyes. I gave him a phlebotomy without letting a large quantity of blood because I hesitated on account of the persons present (29). I intended to purge his nature on the following day; but on this day most of the symptoms subsided. Then came from the cavity of his ear symptoms of meningitis, and I feared that he would in reality be attacked by meningitis. I omitted to administer to him a strong laxative, which should have relieved him, through hesitation and for no other reason. I prescribed for him purging cassia and the like; but all that did not help him. Then I ordered enemas to be given him during three days. When this time had

(29) In the sick-rooms of Oriental patients of rank there is always a large number of persons present.

elapsed, I came back and found him in a most critical condition; he was unsettled in mind, his urine was deep red and his face puffy. I intended to make him bleed at the nose, but hesitated on account of the large crowd which was present and because there had not been a reliable physician before myself. On this occasion I had with me only barley-water, which I administered to him, hoping to procure him some relief. I prescribed for him to drink the juice of vegetable marrow and the mucilage of flea-wort; but he neglected all. The fourth day after this day his condition became extremely critical, and the fatal symptoms made their apparition : one of his eyes became small, his tongue turned blackish and swollen, and he died on the same day at the time at which I had predicted his extinction.

The ignorant physicians (whom he had consulted beside myself) supposed that he was suffering from a (left) facial paralysis, caused by moisture (of his temperament), whereas (on the contrary) the strong contraction of the right eye was due to a spasm in this region.

[*Case IV : Aortic Regurgitation.*]

I was consulted by a man who complained of palpitation of his heart within his chest. When I laid my hand on his left mamma, I felt a pulsation of his aorta so violent as I had never observed before. When he stretched out his left arm to show me his basilic vein, the pulsation of his brachial artery was equally violent, so that it was visible, the flesh being raised and sinking (in a regular fluctuation). He informed me [*fol.* 241 *r.*] that he had been bled from his basilic vein without any useful result, but that eating of hot dishes procured him some relief. I confess that this case baffled me for some time. After having obtained more insight into his disease, I administered to him the musk-remedy, and I obtained an improvement in this patient of such a kind that his condition as regards pulse changed to be the same as in asthmatic patients who have an (emphysematous) distention of the chest, which is not able to inhale the breath sufficiently.

[*Case V : Genital Herpes.*]

MUḤAMMAD IBN AL-ḤUSAIN suffered from the appearance of itch and pustules; later on, pustules broke out on his penis, outside

on the gland. I feared that the same would happen from inside, and this had happened, indeed, as I suspected, some time before.

[*Case VI: Hypertrophy of Prostate (or Calculus?), Causing Paradox Stillicidium, Cystitis and Inflammation in the Pelvis.*]

The long-bearded cotton-merchant (30) suffered from chronic pain in his stomach. They administered to him undiluted strong wine; after he had drunk it, the whole pain descended into his navel, and his urine was obstructed while his bladder was full. One of the diuretic waters caused him to urinate, without my knowing of it, and he made use of this, viz. the diuretic, repeatedly and excessively. Finally it caused his bladder to reach such a condition that the urine exuded involuntarily, containing a white, crude mixture which I supposed to have come down from the upper parts while there was something else obstructing the urine.

After that, he was attacked by paralysis of his two legs simultaneously. He sent for me, and when I came, I found the doctors anointing both his legs with warm oil. I supposed that there was a disease of his bladder and that, by its influence, the two nerves were affected which run to the legs since they are quite near to one another; and that there was a swelling (inflammation) in the region of the origin of these nerves. I made a venesection in the sacral region *(qaṭan)* and it was only a few days before he was able to move both his legs, continuing until the time when I write down this narrative.

[*Case VII: Incomplete.*]

ABU'L-ḤUSAIN, the tailor, had suffered from an inflammatory disease and was cured under my care. After that, he complained to me of a weakness in his stomach. I administered to him pastilles composed of rose and spikenard, and he was seized on the spot with an acute fever which continued with him afterwards...

[*Case VIII: An Ophthalmia or acute, purulent Conjunctivitis.*]

A man who accompanied us on our way (journey)—he was

(30) *Al-Qaṭṭān;* this may be a proper name as well.

ABŪ DĀWŪD who led the donkey (31)—was overtaken with an ophthalmia. When it began, I advised him to have a venesection made, but he did not do it and only applied some cupping. He took a remedy which he had with him, dropped it in his ear—about one ounce—and repeated this in excess, although I warned him seriously [*fol.* 241 *v.*] so that I at last became weary of it; but he did not follow my advice. On the next day his condition grew worse and he developed a violent ophthalmia such as I had never seen before. I greatly feared perforation of the tunics of his eye and escape (of the vitreous) because of the whole cornea there was no more visible than the area of a lentil owing to the intensity of the swelling of the conjunctiva (32). At the first possible moment I applied to him a venesection and took from him in two operations three pounds of blood and even more; this cleaned his eyes of discharge. I then applied the white eye-powder, and he slept from that very hour, his pain was soothed and he was completely cured on the following day so that the people were astonished at it.

[*Case IX : An Appendicitis ?*]

KHĀLID, OF Ṭabaristān (33), suffered from a hot (feverish) disease through a fatigue which befell him. I gave him barley-water and the like until (the heat) was extinguished. But this caused him a pain in the region of the flanks and of the abdomen (*ḥālib*, abdominal veins ?); the doctors thought it to be a colic and intended to administer to him hot electuaries (*jawārishāt*), as they supposed that the barley-water had been harmful to him because he had a residue of the feverish disease in his stomach.

I touched the diseased spot and felt it hot and hard. Thereupon I asked him whether he felt a throbbing in it, and he answered : "A rather violent throbbing." So I supposed that he had a hot swelling (an inflammatory tumour) in that region, made him a venesection in both his armpits and extracted from him about

(31) The camel caravans in the Near East are mostly headed by a donkey wearing a bell and led by his driver who is, consequently, the guide of the whole caravan.

(32) This is called chemosis : an oedema of the conjunctiva surrounding the cornea.

(33) A Persian province south of the Caspian Sea (today called Mazenderān).

200 *dirhams* (drachmae) at one sitting. After this, I administered to him the juice (or an infusion) of leaves of night-shade (*'inab ath-tha'lab*), endive and cucumber-seeds during several days. He was cured and even to such an extent that his affection was much improved on the day on which I made the venesection.

I supposed that the hot (and vicious) water causing the disease was partly allayed and partly carried to the spot in question (34), as there had been no perceptible evacuation (35).

[*Case X: Abnormally concentrated Urine after a Fever.*]

AL-'IBĀDĪ suffered from a hot fever. This passed, but the urine remained discoloured during many days. His condition improved at times and grew worse again, but his urine showed no difference in its colouration (36), although the fever went and came again. Thereupon, I made him a venesection, bled him from the basilic vein and extracted the blood with the lancet. On the same day his urine became light-coloured, and he was completely cured.

[*Case XI: A Case of Smallpox.*]

The daughter of AL-ḤUSAIN IBN 'ABDAWAIH had drunk camel's milk as usual, without asking my advice. When she became meteoric after the milk, she took the musk-remedy without having previously submitted herself to a venesection or to purgation. She developed a continuous fever, and there appeared on her body the symptoms [*fol.* 242 *r.*] of smallpox; she had, in fact, four attacks of smallpox one after another (37). When the smallpox began and she consulted me, I took care of her eye[s], and strengthened it [them] with antimony-powder rubbed in rose-water, and nothing appeared in her eye (38), although its surroundings were very severely affected. All the people who were near her, wondered at this astonishing fact that her eye was saved.

I applied to her for some time barley-water and the like, and

(34) I.e. the hot and hard spot in the abdomen (appendicitis?).

(35) That is to say, the breaking out of an abscess or the like.

(36) Probably dark, reddish brown, as usual in fevers.

(37) I.e. four attacks of recrudescent fever.

(38) Dangerous purulent pustules of the cornea, often a cause of blindness, are a frequent complication of smallpox.

her nature did not show any change as is so frequent a consequence of this disorder. There remained some residue of hot fever, and I supposed that this might be because the remainder of the (ill-natured) humours had not been expelled by the usual purgation; I could not venture to obtain an evacuation at once because of the weakening of her forces. So I confined myself to administering to her dried apricots *(naqū')* at day-break and barley-water at noon during a fortnight. This procured her two evacuations a day, and she was completely cleared of the disease. The maturation of the urine (39) appeared after forty days, and her recovery was complete at the end of fifty days.

[*Case XII: Obesity and Gout.*]

Concerning the son of AL-ḤUSAIN IBN 'ABDAWAIH, the doctors supposed that he was of humid temperament on account of his obesity, because they were unable to distinguish between a fleshy man and a fat man. He had an attack of pain in his articulations, which subsided later on. I applied to him several venesections and administered to him once a week a purgative containing a remedy which evacuates the yellow bile, because this (nocive) mixture (of humours) was an acrid purulent matter. I prescribed to him as diet sour, bitter and astringent aliments and forbade him sweets, strong and fatty foods. This disease subsided and caused him only unimportant attacks. When he had followed this prescription for a long time, he was completely [restored] and his body began simultaneously to lose flesh.

[*Case XIII: Semitertian Fever.*]

IBN IDRĪS was suspected of being attacked by the worst form of semitertian fever (40), the acuteness of which was great; it became chronic while the doctor administered to him pastilles of bamboo-sugar *(ṭabāshīr)*. I prescribed to him to drink barley-water after a dose of oxymel *(sikanjubīn)* and to delay his meal every day until the time of the decrease of the fever and to avoid as much as possible the time of the (feverish) attack. I insisted

(39) I.e. its clear, normal, yellow colour.

(40) It is mixed fever, described by GALEN (*De Differentiis Febrium*, II, 7. Ed. KÜHN, vol. VII, pp. 358-65) under the name of ἡμιτριταῖος πυρετός; the Arabic term is *ḥummā shaṭr al-ghibb*.

upon this prescription, but he found it difficult. I told him, however : " You cannot have any other prescription than this '! Thereupon he followed my advice during several days in my absence, and he came to see me after ten [*fol.* 242 *v.*] days and was completely restored.

[*Case XIV : A lacrymal Fistula.*]

The son of 'ABD AL-MU'MIN, the goldsmith, had a lacrymal fistula *(gharab)*. I prescribed to him to rub in an eye-wash which I had prepared for him (*scil.* with water) and to insert it by drops into the inner corner *(mūq)* (41); he did this and was healed.

I know, however, that this is not a real healing, only a shrinking and drying up of the fistula, but not a clogging (cicatrisation); I have experienced that repeatedly. GALEN speaks of the same matter among his rare cases; it was this that caused me to compound the eye-wash in question (42).

[*Case XV : A Mastitis.*]

The wife of JA'DAWAIH, the sister of ḤAIDARA, suffered from a feverish disease; I gave him every day a prescription (for her) when he brought me her urine (43). One day he came to tell me that she had got pain and swelling in her mamma. I prescribed to him to avoid the application of cold and to employ massage, and in this way the disease was cured. I informed him that the affection would recur if the pain was soothed suddenly without administering a purgative. But this woman was inclined to rest, as I believe, and allowed her extremities to become cold. This pain and swelling subsided, indeed; but the disease and the (nocive) mixture (of humours) returned in the severest possible manner. Thereupon I advised him to repeat the covering and cooling, and I purged her; she was cured.

(41) Better *ma'q*; *mūq* is the popular name of the inner corner (canthus) and caruncula of the eye.

(42) Perhaps a plaster of white-lead and *oxelaeum*, mentioned by GALEN in his *De Compositione Medicamentorum per Genera*, I, 7 (ed. KÜHN, vol. XIII, p. 401 et seq.).

(43) We must not forget that in olden times many pious Muslims did not permit the doctor to examine or even to see their wives; so the diagnosis was confined to the inspection of the urine.

[*Case XVI: Septic Arthritis after an Abscess in the Liver?*]

The door-keeper, AL-ḤASAN, was attacked by a very acute disease; he had suffered from a hot (swelling of the) liver and the residue (matter) had been repelled to the articulations so that they became swollen while the fever subsided; this condition continued with him. A doctor made him a venesection, whereupon some acute feverish affection returned, his strength decreased rapidly and he died after three days.

[*Case XVII: Eclampsia?*]

The woman who was brought to me by ABŪ 'ISĀ AL-HĀSHIMĪ, the coppersmith, was of very fat and humid constitution. She had suffered during her confinement from a plegia *(fālij)* and after that from epileptic fits *(ṣar')*; there was no doubt about her case as it showed real and unmistakeable indications. I purged her with strong potions which expelled the phlegm, and I prescribed to her after that to take the Theriac of the Four (44); but the druggist *(ṣaidalānī)* gave her, instead of this, Anacardium (45); she was marvellously well restored.

[*Case XVIII: Epilepsy.*]

Our neighbour, the cloth merchant in the Street of Lucerne *(Darb an-Nafal)* (46) suffered from epileptic fits from his childhood; he was slim. So I supposed that his disease was not caused by an excess of phlegm and prescribed to him emetics to be taken repeatedly. After that, I administered to him a potion which energetically expelled the black bile. Thereupon he was free from epileptic fits [*fol.* 243 *r.*] for three months, and the neighbours in the quarter came to thank us. Hereafter he ate fish and drank much wine; he had an epileptic fit the same night. He again began to take the emetic, followed by the potion as before, and his condition improved. Then he resigned himself to take regularly and without reluctance the emetic and that potion up to the time when we left Baghdad. Previously he had

(44) The composition of this remedy is given by GUIGUES, *Le livre de l'art du traitement de Najm ad-Dyn Mahmoud*, Beyrouth, 1903. p. 146. See below under A.

(45) The cashew nut (fruit of Semecarpus Anacardium).

(46) This must have been one of the wards of Baghdad. See below under E.

been treated at the Hospital (47) with purgations without any success.

[*Case XIX: Epilepsy?* (48)]

I recognised a bookseller, named NAẒĪF, as epileptic by his face as I saw that his Jugular veins *(widājān)* were full, his face red and puffy. He was stout, with red eyes and of plethoric constitution. I ordered the physician-lecturer (49) to bleed him at the Vena saphena; he bled him at the Basilic vein. I followed the case, who during a year remained free from epileptic fits.

[*Case XX: Haematemesis. Varices of the Oesophagus in Hepatic Cirrhosis?*]

A man consulted me, who had vomited two pounds *(raṭl)* of blood following on excessive drunkenness. I found his eyes red and his body plethoric. Thereupon, I made him a venesection and administered to him astringent remedies, and he was restored to health.

[*Case XXI: Haemoptysis.*]

A man expectorated blood when coughing. One day he ate sparrows fried in oil, and expectorated after that three pounds of blood, like the blood extracted by cupping, big clots; it was feared for his life. Later on I saw him again in healthy condition except that he had a slight but incessant cough. Thereupon I prescribed to him as diet fresh fish, and the expectoration was stopped.

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(47) This was perhaps the hospital founded in 306 A.H. (c. 918 A.D.) by the caliph AL-MUQTADIR, under the name of *al-Bimāristān al Muqtadirī*, and in which RHAZES was for some time one of the physicians. See AHMED ISSA BEY, *Histoire des Bimaristans (hôpitaux) à l'époque islamique*. Le Caire, 1928, p. 177 et seq. and our remarks under A.

(48) Possibly a hypertonic, cerebral, convulsive affection.

(49) Literally, "the reading-out physician." The lectures on Medicine, Philosophy and other sciences were given in this way: one of the students or assistants read out part of a medical, or other text-book, and the professor then gave explanations, asked and answered questions. This scholastic method of instruction had been in existence since the Hellenistic period and was in use in Europe as late as the XVIIth century.

[*Case XXII : Alopecia.*]

A man, a native of Dārā'ī al-Aqwāl (50), consulted me for an alopecia (51) on his head, two fingers in diameter. I advised him to rub the place with a piece of cloth until it almost began to discharge blood, and to rub it after that with onion. He did this in an excessive way many times, provoking blisters. I prescribed to him to anoint the spot with fowl's fat; thereupon the itch ceased, the malady subsided and the hair grew again within a month and became more beautiful, blacker and thicker than before.

[*Case XXIII : Hydrorrhoea tubalis intermittens.*]

The wife of the fuller (52), agent of the son of Sa'īd ibn 'Abd ar-Raḥmān, showed symptoms of dropsy; it was not possible to ascertain that by direct inspection (53). I administered to her sometimes water of the great cardamon *(? falāfil)* and sometimes a remedy of turmeric *(kurkum)*. One day, when she was washing and bending over the washtub, there suddenly poured from her about twenty pounds *(raṭl)* of a yellow liquid, and she was relieved and at rest [*fol.* 243 *v.*] for a while; later on it recurred (the dropsy). I then took exact information about her and ascertained that she must suffer from a disease in the uterus, and so I treated her accordingly. She believed that she was pregnant, but she was not.

You must understand this and make your investigations accordingly as there is one of the diseases of the uterus resembling pregnancy !

[*Case XXIV : Acute Glomerulonephritis following Measles.*]

The little son of Ibn Sawāda had a yellow bile fever from his throat. On the fourth day in the morning he began to urinate blood and to pass with the stool green and bloody bile, resembling water in which fresh meat had been washed; his strength decreased suddenly. We were baffled because his malady had been slight and benign and then had changed in one night to this acuteness

(50) This may be the name either of a ward or of a house in Baghdad.

(51) Literally, " fox-disease " *(dā'ath-tha'lab)*, a translation of the Greek name ἀλωπεκία (bald patches on the head).

(52) In Arabic *al-qaṣṣār*, which may be a proper name.

(53) Probably not allowed for the reason given in the note 43.

and severity; we supposed that he had drunk something (harmful). When the afternoon came, he had a quite black micturition and equally black stools. He died in the early morning of the sixth day. He had had from the beginning a malign form of measles, prone to attack the internal organs (54).

[*Case XXV: A Cholecystitis?.*]

A woman came to consult me with a urine as black as bile. She declared she had pain in the spine of her back, and that this pain had subsided since the time she had this (black) micturition; she had had this micturition for ten days before she came to see me. She suffered from a nocturnal fever causing shivering every night, and the bile was black-natured. I prescribed to her a diuretic.

[*Case XXVI: An Abortion, or a submucous Myoma.*]

The wife of Abū 'Īsā (55) was attacked by a colic of moderate severity. She took *sahar-bārān* (56) and after that a remedy containing a quantity of heating elements. The seat of the pain was in the uterus; at the same time the patient suffered from constipation owing to pain and swelling in the uterus, which compressed the Cœcum *(a'war)*. The pain became violent when the " burden " came down, and the constipation was caused by the coming forth (prominence) of the " burden." When she had taken these remedies, something protruded from her anterior parts (pudenda) resembling the placenta. I ordered the midwife (57) to touch and ascertain its consistency; she found it soft, flabby and lacking sensation. I prescribed to the patient to bind her legs together for two days and then ordered (the midwife) to cut off the insensible part. Thereafter, something protruded three times, was cut off, and the patient was healed.

[*Case XXVII: Phthisis.*]

Our neighbour, the phthisical old man expectorated much blood

(54) See end of Case XXVII.

(55) See Case XVII.

(56) An Arabo-Persian name for a drink, perhaps syrup of melissa *(bārān)*.

(57) Midwives alone were allowed to examine female patients, and to operate on their genital parts.

during a long time. Afterwards his condition grew worse; he took pills (pastilles) which stopped the cough and he felt better each time he underwent this treatment for some days. But soon afterwards he died while I had been unable to examine his condition during these [*fol.* 244 *r.*] days.

Therefore it is important to avoid remedies which stop expectoration, except in the cases where the matter flows down from the head.

It is, moreover, important to refrain from compresses on the abdomen in cases of measles and smallpox as this may cause distress to the respiration immediately, and malignant diarrhoea and haematuria; an example of this is the son of SAWĀDA (58).

[*Case XXVIII: Vasomotoric Collapse in Pleurisy*] [*fol.* 244 *v., last line*].

The money-changer *(jihbidh)*, AL-ḤASAN had a disease regarding which it was at first doubtful whether it was a pleurisy *(dhāt al-janb)* [*fol.* 245 *r.*]; afterwards this diagnosis was confirmed, but they made him no venesection... (59) was hot and his expectoration creamy and white. When I saw him on the eleventh day, his extremities were like ice and could not be warmed by any means. There had been no fever beforehand —I had been informed about him since the seventh day—but his body had been cold and his eyes had been fixed. He asked on that day for a venesection, but when I touched his artery, I found it collapsed and slack, and so I prevented him from being bled. His saliva had a bad smell and his condition was as it is described in the *Book of Acute Diseases* (60). I thought that he would live one day more, but he died after only eight hours.

[*Case XXIX: Hay-fever (?), followed by Rheumatic Polyarthritis.*]

The son of AL-ḤASAN IBN 'ABDAWAIH (61) suffered from attacks

(58) See Case XXIV.

Now follows an interpolation by RĀZĪ regarding the first case of HIPPOCRATES' *Epid. I.* It is placed at the end of this translation.

(59) A gap in the Arabic text.

(60) What is meant is probably HIPPOCRATES' *De Diaeta Acutorum.*

(61) See Cases XI and XII.

of coryza so heavy and severe that I have never witnessed a similar case before. Even the slighter form of it used to remain with the sufferer a month and more and to descend to the chest, causing coughing and expectoration. This patient showed an improvement about the middle of the day so that he did not feel any discomfort, but this caused him pain in the articulations.

You must know that this case is like GALEN's description (62), viz. that the discharge of residue (matter) is not effected by the canals (pores) of the body, but by the joints of the limbs. For this reason (his coryza) used to leave him suddenly, but caused pain in the articulations, because the residue was attracted to the articulations.

[*Case XXX: Sciatica or Lumbago.*]

A nobleman in Baghdad had a pain in the hip-bone *(wark)*. The doctor administered to him grains of gnidium *(mathanān)* and fumitory *(shaiṭaraj)* because his urine was light-coloured and his body robust, his diet heavy. But his hip-pain increased, and his malady grew worse so that he was not able to stand in an erect position. Then he administered to him an enema, but his condition grew worse. Thereupon he asked for my help, and I prescribed to him an emetic on a full stomach several times. After that I anointed his hip-bone with mustard until it (*scil.* the skin) was covered with blisters. His pain subsided and lessened until it nearly disappeared. After that I administered to him an enema causing abrasion (of his intestinal mucous membrane) (63), and he was cured.

[*Case XXXI: Sciatica or Lumbago?*]

The sister of the bookseller suffered from a pain in the hipbone. I administered to her an enema, but she asked for a purgative. I then prescribed to her an enema with the water in which salted fish had been washed; she took it and was cured after having received an abrasion (of the intestinal mucosa).

(62) It is impossible to find which case of GALEN's many observations on arthritis is meant. RHAZES, himself, wrote two short treatises on hay-fever (" On the reason why the heads of people swell at the time of the roses and generate coryza," etc.). See J. RUSKA, p. 37.

(63) I.e. an enema with caustic remedies, such as mustard or salt water. See the following case.

[*Case XXXII: Sciatica?*]

The same was the case of IBN DALĪL. He had refused an enema and had become lame from his hip-bone. He then drank the pulp [*fol.* 245 *v.*] of colocynths in great quantity (64) and was healed.

[*Case XXXIII: Cholangitis (?); Infectious Icterus.*]

The son of 'AMR IBN WAHB became feverish and a very intense jaundice made its appearance on him, so that his eye looked on the fifth day like a piece of cartham (65). On the ninth day he had a retention of urine, and he passed only very little, three drops (coloured) like the contents of the gall-bladder. He passed blackbiled stools, and his urine on the sixth day was black, then red with yellow froth on it. Then... (66). On the eleventh night he had a severe haemorrhage from the right nostril; then he died on the thirteenth night without having lost his sound mental capacity and consciousness. He was attacked by gasp (death-rattle) and coryza, and the swelling of his liver was manifest.

[*Case XXXIV: Hemiplegia? Incomplete observation.*]

The whole of one half of IBN NUṢAIR's body felt continually hot and the other half cold as ice; the cold half had no pulse, the other half a quick pulse. The tendons of his neck were taut, his urine was white like running water and the eye on his cold side was small and very much wrinkled (contracted)... (67).

[*Interpolation between Cases XXVII and XXVIII, beginning on fol.* 244 *r., line* 4 *of the MS.*]

Epidemics: The first patient of the first Book (68): This man had a burning fever with great heat during the whole of one day; thereafter he perspired greatly during the night, without this perspiration checking his fever or bringing him any relief.

(64) A very drastic purgative.

(65) Safflower or bastard saffron.

(66) A gap in the Arabic text.

(67) Unfinished.

(68) This observation, concerning a man named PHILISCUS, is extracted from HIPPOCRATES' *Epidemics*, Book I (LITTRÉ's edition, vol. II, p. 682 et seq.) and GALEN's Commentary III on the same book, second part (KÜHN's edition, vol. XVII A p. 253 et seq.).

On the contrary, during the whole of this night and on the second day the symptoms of his disease grew worse. After this, he received an enema on the day in question, had a motion and was better during the whole of the following night and half of the third day. Near the end of this day the fever recurred with violent thirst, dryness of the mouth and sweating, which did not relieve the fever at all, also with delirium and hallucinations, and the patient during the course of this night passed dark-coloured urine. Thereafter he had some relief in the night preceding the fifth day and during the first half of this day. Then he discharged from his nostrils a few drops of blackish blood, and he passed urine in which were suspended particles like *semen virile* of varied shape, roundish and other forms, which did not form a deposit. The patient's condition was still serious during the whole of the night preceding the sixth day; this night his limbs became cold and were to be warmed only with difficulty, he slept very little, passed blackish urine and had delirium. On the morning of the sixth day he was speechless and had cold perspiration. Later, about the middle of the day, his extremities became greenish, and he died. Throughout the course of the disease his perspiration was cold, his respiration deep and broken.

In this patient the symptoms of malignancy were evident from the beginning of the first night as shewn by the fact that he perspired constantly but had no relief from his fever. HIPPOCRATES says that in the event of symptoms of a crisis being present without the coming of a crisis, these symptoms either announce death —and this if they are accompanied by symptoms of fatal prognosis —or predict a long course of the disease—this latter in the case of their being accompanied by symptoms [*fol.* 244 *v.*] of healing. When this patient's fever did not relax after the perspiration but became more violent and malignant on the second day and the sufferer passed dark-coloured urine on the third day, all this confirmed the indications of malignancy. I mean to say, after the symptoms of crisis there appeared still another symptom announcing death and confirming and corroborating the first. I mean by the first the fact that the fever was not relieved by the perspiration; this was followed by sleeplessness, delirium and thirst. When, on the fourth day, the symptoms became more definite and he passed blackish urine, this indicated two

features, viz., firstly, that the disease had reached the (vital) spirits *(arwāh)* because they were affected already on the second and third day, and, secondly, that his death would occur by way of the (vital) spirits. The fourth day is similar to the sixth and seventh, except if the acuteness is very great and the symptoms indicate death, when it is likely to occur on the sixth day. When he reached the sixth day and the attack came on with severe symptoms and he died on this day, it was confirmed that his crisis had presaged the occurrence (of his death) on this day. He had passed blackish urine on the third and fourth days, and this indicates extreme malignity and acuteness; for if the intensity and violence (of the fever) appears in two subsequent attacks, this is a strong indication of the acute character (of the fever). When this was followed, on the fifth day, by trickling of blood from his nostrils, this was a sure sign of dwindling of his strength. Had his strength been greater and the violence of his malignant symptoms less, his death would have been delayed until the eighth day. His mental condition supplied an indication of the confusion of his intelligence, as it has been described (by HIPPOCRATES) in the *Epidemics*, and the cold perspiration throughout the course of the disease lessened his strength but not the power of the disease. The second acute attack which seized him on this occasion, is an indication that one must not rely on an intermittent calming down (of the symptoms) if there is not at the same time an improvement in the causative crisis; for the acute attack is likely to recur in such cases. Consequently, the symptoms occurring in this observation have all been mentioned, except the urine in which a spermatoid formation was suspended. All the other observations are in accordance with the contents of the books of the *Prognostic*, the *Crisis* and its *Days*.

D. — SUPPLEMENTARY REMARKS

As I mentioned earlier, RHAZES, himself, did not place heads or a diagnosis above his observations. They follow on without any separation. It is not always possible to recognise the diseases which are described in the foregoing text. In attempting to do this I have received precious help from several medical friends

practising in Cairo : Dr. SCHLESINGER, specialist in internal diseases, Drs. ROSENAUER and LUCHS, surgeons, and Dr. ROY DOBBIN, professor of Gynaecology and Obstetrics of the Faculty of Medicine, Egyptian University : I take great pleasure in thanking them for their kindness.

Case I has been translated by E. G. BROWNE. He found in it " several difficulties, both verbal and material," but could recognise the general nature of the case. In his translation, as mentioned earlier, we have to replace the word " ulceration " by " abscess," and (p. 52) " the ulceration was slight " by " the abscess was small." We thus obtain a clear idea of the case, which was one of renal abscess, characterised by a very irregular fever, and then perforating into the renal pelvis. The judgment of my Cairo colleagues on RHAZES' accomplishments in this case is " that he made all the observations that he could make without the help of modern chemical and microscopical methods."

Case II is a simple case of dysentery. Here RHAZES followed the theories of the Greek physicians concerning the influence of yellow and black bile.

Case III : This is an undoubted case of otitic meningitis, well diagnosed and expounded by RHAZES.

Case IV : It is certainly an incompetence of the aortic valve, one of the rare cases described during the Middle Ages.

Case V : In this case, the diagnosis of genital herpes is not quite sure but very probable. The preceding internal affection of the urethra may have been a gonorrhoea.

Case VI is not quite clear. It offers remarkable resemblance to certain tuberculous affections of the pelvis, causing at first retention of the urine and calculi in the bladder and then paralysis or paresis of the sciatic nerves. The rapid cure of this latter affection is somewhat puzzling.

Case VIII is a very common one in the Near East, especially in countries which have a very hot and dry summer. It is a case of acute conjunctivitis, offering the appearance of a gonorrhoeal ophthalmia. We know to-day that this form of contagious conjunctivitis is generally caused by the bacillus discovered in 1883 in Egypt by ROBERT KOCH and in 1887 in New York by

JOHN WEEKS. It is able to cause an enormous swelling of the lids and conjunctiva (chemosis) without causing any harm to the cornea. As nitrate of silver, the best remedy for this affection, was unknown in the time of RHAZES, his de-congestive treatment was not bad.

Case IX is probably, but not for certain, an appendicitis.

Case X is only a symptomatical observation: high concentration of the urine lasting for a long time after a fever, possibly a case of nephritis. The clearing up of the urine is called by the old doctors its " maturation."

Case XI is one of smallpox, described in such a masterly manner by RHAZES in his famous book *On Smallpox and Measles*. In the present case he lays stress on his successful measures to preserve the cornea of the eyes from pustules. This is of the greatest importance in Oriental countries where, even in our time, destruction of the cornea, by formation of white spots and resulting blindness is one of the most frequent consequences of smallpox. Up to the time of the introduction of JENNER's vaccination, it was one of the principal causes of blindness even in Europe and much more so in the East.

Case XII is one of obesity with gout, combated by RHAZES in a very reasonable manner. The only difference is that what RHAZES terms " yellow bile," we call uric acid.

Case XIII follows the lines of ancient, especially Galenic, medicine. We see the physician making his prescription on diet with severity because Oriental patients very often refuse to follow advice which does not accord with their daily habits.

Case XIV: In this case of lacrymal fistula RHAZES shows sound judgment regarding the doubtful value of medical treatment. The oculists who wrote not long after RHAZES' death ('ALĪ IBN 'ISĀ of Baghdad, 'AMMĀR of Mōṣul and others) insisted on the necessity of surgical treatment (scraping and cauterisation) of such fistulae.

Case XV was not seen by RHAZES personally, as it concerned a woman suffering from mastitis, and he was obliged to form his opinion on the basis of descriptions given by her husband. Half a century ago similar conditions still existed in Egypt, Turkey

and Persia, and still do today in some remote parts of the Islamic world (Afghanistan, India, etc.).

Case XVI: RHAZES' notes on this patient whom, evidently, he had not seen until a few days before his death, are not sufficiently complete to allow of a retrospective diagnosis.

Case XVII is a doubtful case of eclampsia. The *Theriac of the Four*, which is mentioned in this observation, contains (according to GUIGUES' publication quoted in the note 44) Greek gentian, laurel grains, long aristolochia and pure myrrh. None of these drugs has, according to our present conception, any active, antispasmodic principle.

Case XVIII is described as an epilepsy, while *Case XIX* seems to show more an apoplectic than an epileptic type.

Case XX is too brief a description to allow of an exact retrospective diagnosis. In a drunkard haematemesis by varices of the oesophagus (hepatic cirrhosis) is possible and even probable.

Case XXI is probably a tubercular haematemesis.

Case XXII, an alopecia, is interesting on account of the remedy. The principle of causing the hair to grow on the diseased, round, bald spots by application of irritating substances, is still in use in our day.

Case XXIII is very well described. It is possibly one of intermittent tubal hydrorrhoea, which RHAZES noted with the intention of explaining the difference of diagnosis in this affection and in a pregnancy.

Case XXIV: There is hardly any doubt here that it was a case of Bright's disease after quinsy or measles.

Case XXVI may refer to an abortion of slow progress or a submucous myoma. Personal observation was impossible for RHAZES, who had to base his report on the sayings of the midwife.

Case XXVII is one of phthisis. RHAZES wishes to show the dangers of cough-relieving remedies in similar cases.

Here follows in the original text the explanation of the first case in HIPPOCRATES' *Epidemic Diseases*. It is certainly not in its right place since it should be compared with a similar case out of RHAZES' own observations. This case is missing in our

text. I have therefore placed the *exposé* on *Epidemics* at the end of RHAZES' cases.

Case XXVIII, to be compared with one in HIPPOCRATES' *Diet in Acute Diseases*, is one of vasomotoric collapse during a pleurisy.

Case XXIX is not clear : possibly hay-fever or simply a severe cold, followed by rheumatism. It should be compared with one of GALEN's cases, or, perhaps, with his assertion in *De probis pravisque Alimentorum Succis* (chap. 19, ed. KÜHN, vol. VI, p. 814) that " thick chymes " are a cause of arthritis.

Cases XXX to XXXII are sciatica or lumbago. The application of counter-irritation by blistering the skin with powdered mustard is very reasonable.

Case XXXIII is one of feverish jaundice (infectious WEIL's disease ?) and may in certain particulars compare with the case from the *Epidemics* preceding Case XXVIII.

Case XXXIV, like Case VII, is incomplete : it is a vasomotoric paralysis, caused perhaps by a cerebral affection.

The exposition of Case I of HIPPOCRATES' *Epidemics* does not follow the lines of GALEN's commentary (ed. KÜHN, vol. XVII A, p. 253 et seq.), who lays more stress on the respiration which in this case resembled the CHEYNE STOKES' symptom. RHAZES insists more on the cold perspiration, bleeding at the nose and other external symptoms of malignant fever.

To sum up, the above observations are certainly good, interesting and almost unique in the whole medical literature of the Middle Ages.

E. — SOME LIGHT ON RHAZES AS A PRACTITIONER

The above text, in addition to its medical interest, makes it possible to learn for the first time a little about RHAZES' practical work during his sojourn in Baghdad. In Case XVIII he says, himself, that the observation in question was made in that capital of the Caliphs some time before he left the city. He writes, also, that he lived in " the Street of Lucerne " *(Darb an-Nafal)* (69),

(69) Corrupted in the text to *Darb an-Naql*, which has no reasonable meaning.

which is not mentioned in the geographical treatises of the Arabs, but is in accord with the names of many streets, quarters and bridges in the suburb of al-Karkh, the great commercial centre in the south of the capital. Here we find " the Myrtle Wharf," " the Melon House," " the Barley Street," " the Thorn Bridge," " the Alkali Bridge," " the Pomegranate Bridge," and other names which show that the markets for the commodities in question were situated in those districts. Here also were the markets of the butchers, poulterers, soab-poilers, reed-weavers, oil-merchants, cooks, cloth and cotton merchants and many others. Moreover, the " old " hospital, viz. the Muqtadirī Hospital, mentioned before, where RHAZES must have given his lectures, was situated in the western part of al-Karkh, near the bridge over the Karkhāyā Canal (70). I suppose that RHAZES had his lodging in this quarter because most of his patients belonged to the craftsman and merchant class.

First of all, we observe that the names of patients given by RHAZES in his short account, are nearly all Muḥammadan names (MUḤAMMAD, AL-ḤASAN, AL-ḤUSAIN, KHĀLID, 'ABDALLĀH, 'ABD AL-MU'MIN, 'AMR, NUṢAIR, IDRĪS, AL-HĀSHIMĪ, AL-'IBĀDĪ, etc.) (71). There is only one name, NAẒĪF, which could be Christian (Its meaning is " pure," an equivalent of the Greek *Katharos* (72)). The occurrence of several half-Persian names ('ABDAWAIH, 'AMRAWAIH, JA'DAWAIH) is in no way surprising as the amalgamation of the Arabian conquerors with the vanquished inhabitants of Mesopotamia had begun in the VIIIth century. We see also that RHAZES was family-doctor of several families. He treated the son and daughter of AL-ḤASAN (or AL-ḤUSAIN) IBN 'ABDAWAIH (Cases XI and XXIX), 'ABDALLĀH IBN SAWĀDA and his son (Cases I and XXIV), the coppersmith, ABU 'ĪSĀ AL-HĀSHIMĪ, and his wife (Cases XVII and XXVI), the bookseller, NAẒĪF, and his sister (Cases XIX and XXXI). Several of the patients were his neigh-

(70) See LE STRANGE, *Bagdad during the Abbasid Caliphate*. Second edition (London, 1924). Map IV, facing p. 57, No. 7.

(71) The repeated mention of wine and drunkenness show that the Muslim inhabitants of Baghdad did not regularly observe the prohibitory rule of the Islamic religious Law.

(72) I met with this name as that of a Greek Christian in IBN ABĪ UṢAIBI'A's work. The name *Καθαρός* is testified to by Greek documents from Egypt, according to FR. PREISIGKE, *Namenbuch*, etc. Heidelberg, 1922, p. 156.

bours in the street or the quarter (Cases XVIII and XXVII).

As to the rank and profession of RHAZES' patients, we find among them a modest doorkeeper and a caravan-guide, as well as craftsmen (a coppersmith, a fuller, a goldsmith, a tailor, etc.), merchants (a cloth and a cotton merchant, a bookseller, a money-changer), officials (an accountant), and noblemen (Cases III and XXX). It is pleasant to learn that RHAZES, who did not come to Baghdad until he had already a great reputation, took under his care patients of all kinds without regard to their social or financial standing. The fact that the names of Christian and Jewish patients are missing from RHAZES' observations (although both these elements were largely represented in Baghdad and particularly in the suburb of al-Karkh) may be due to the mistrust with which Muslim practisers of medicine were regarded even by their own people (73). It was, indeed, RHAZES himself, who by his prodigious skill and science—the like of which had up to then only been seen among Christian scholars—broke the ice and prepared the way for the Muslims. We read in his account, looking between the lines, that he had to combat mistrust and bad faith on the part of some patients who either did not consult him a second time or consulted other doctors behind his back, just as we still observe to-day with Oriental patients. Regarding the impossibility of a thorough examination of Muhammadan female patients, we have already referred to this difficulty in our notes on the cases.

If other Arabic and medico-historical scholars will follow and set to work to extract the many personal observations made by RHAZES in his enormous *Continens*, the aim of this modest sketch will be fulfilled.

Cairo. MAX MEYERHOF.

Additional Note : Concerning the observation no. VII, Dr. PAUL KRAUS (of Paris) was kind enough to attract my attention to the fact that a certain ABU'L-ḤUSAIN AL-KHAYĀṬ (i.e. " the Tailor ") was a contemporary and philosophical opponent of RHAZES in Baghdad. He belonged to the eighth " generation "

(73) See BROWNE, *Arabian Medicine*, p. 7 et seq.

of Mu'tazilites (rationalistic theologians) in this capital. One of his works, a refutation of the heretic IBN AR-RĀWANDĪ was edited by NYBERG (Cairo, 1925). RHAZES himself wrote several polemical tracts against ABU'L-ḤUSAIN AL-KHAYĀṬ (see RUSKA's edition of AL-BĪRŪNĪ's list, *Isis*, 5, 26-50). It would be of great interest to know wether, in spite of their scientific dissensions, he had to take medical care of his adversary.

Concerning case X, Dr. KRAUS thinks that the Mesopotamian tribe of AL-'IBĀDĪ was Christian and remained so still during the Xth century A.D.

٣٢ – وكذا كان حال ابن دليل لم يحتقن بل كان قد عرج من (ص ٢١٠ ق) وركه فشرب شحم * الحنظل كثيراً وبرأ .

٣٣ – ابن عمرو بن وهب حم وظهر به يرقان غليظ جداً حتى كانت عينه قطعة عصفر فى اليوم الخامس واحتبس بوله فى التاسع فكان لا يبول إلا شيئا نزرا[١] مقدار ثلاث قطرات كأنه ما فى جوف المرارة واختلف اختلاف السوداء أسود وكان بوله فى السادس أسود ثم صار أحمر عليه زبد أصفر ثم . . .[٢] فلما كان فى الليلة الحادية عشر رعف[٣] من المنخر الأيمن رعافاً صعبا ثم مات فى ليلة الثالث عشر ولم يزل صحيح العقل ثابتا وهاج به فواق وزكام وكان ورم كبده ظاهر[٤] .

٣٤ – أحس[٥] ابن[٦] نصير كل نصف بدنه حارا بالطول ونصف بدنه الآخر باردا كالثلج ولا نبض له فى النصف البارد وله نبض سريع بفى الثانى وقد تشنّج اوتار عنقه وماؤه ابيض كالماء الجارى وعينه الذى فى الجانب البارد قد صغرت وتقلصت جدا جدا . . . . .

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(١) برارا (٢) بياض بالأصل (٣) ورعف (٤) ظاهر
(٥) الحس (٦) أست

الجنب * ثم صح ذلك ولم يفصد . . . [١] حار ونفثه زبدى ابيض ورأيته (ص ٢٤٠ و)
فى الحادى عشر وأطرافه مثل الثلج لا يسخن بحيلة ولم يظهر به فيما قبل ذلك حمى فان خبره كان يجيئنى منذ اليوم السابع بل كان بارد البدن وكانت عيناه جامدتين وأراد الفصد فى هذا اليوم فلما مست عرقه رأيته منقبضاً منحلا فنهيته عن ذلك وكان بزاقه قد تريح فصار كما فى كتاب الأمراض الحادة فحدست أنه يبقى مدة يوم فمات بعد سبع ساعات أو ثمان.

٢٩ — ابن الحسن بن عبدويه كان يصيبه أغلظ ما يكون من الزكام وأشده ما رأيت [٢] مثله وما هو أقل منه يبقى على من يصيبه الشهر والأكثر وينزل إلى صدره حتى ينفثه بالسعال فكان يسكن عنه فى نصف يوم حتى لا يجد شيئا [٣] منه البتة ويهيج به وجع المفاصل. فينبغى أن تعلم أن الأمر على ما وصف جالينوس ان دفع الفضول ليس إنما يكون بالمجارى العيانية بل باتصال [٤] الأعضاء وإنما كان يسكن عنه فسرعة ويهيج وجع المفاصل لأن الفضل كان ينجذب إلى مفاصله.

٣٠ — رجل ببغداد كان من العجلة كان به وجع الورك سقاه الطبيب حب المثنان [٥] والشيطرج لبياض مائه وغلظ بدنه وتدبيره فازداد وجعه واشتد مابه حتى لم يتهيأ له أن يستوى فحقنه فزاد شراً واستعان بى فقيأته [٦] على الامتلاء مرات ثم بعد ذلك طليت وركه بالخردل حتى تنفط وخف وجعه ونقص حتى ذهب أكثره ثم حقنته بحقنة سحجته فبرأ.

٣١ — أخت الورّاق كان بها وجع الورك وصفت لها حقنة فارادت شيئا مسهلا امرتها أن تحتقن بماء السمك المالح ففعلت وبرت بعد أن سحجتها.

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(١) بياض فى الأصل (٢) رايته (٣) شيء (٤) وباتصال
(٥) المتن (٦) فقئته

لكنها كانت فى الثانى أقوى وأشر فلما بال فى الثالث بولا اسود حقق دليل الرداءة . وذلك انه ظهر بعد الشيء الذى به يكون البحران علامة أيضا قاتلة اكدت الاولى وشهدت لها اعنى بالاولى[١] ان تخف بالعرق . وتبع ذلك ايضا الارق والاختلاط [٢] والعطش . فلما كان الرابع واشتد ما به اكثر وبال بولا اسود ايضا صح منه شيئان احدهما ان مرضه يصعب فى الارواح لأنه كان قد صعب فى الثانى والثانى ان موته يكون فى الارواح . والرابع ينذر بالسادس والسابع الا انه اذا كانت الحدة شديدة والدلائل مهلكة مال الى السادس . فلما كان فى السادس فاجأته النوبة مع أعراض صعبة فمات فيه وحقق ان بحرانه مال الى السادس . بوله فى الثالث والرابع بولا اسود فان هذا يدل على غاية الخبث والحدة لانه ان كانت الصعوبة والشدة نوبتين متصلتين فالدليل على الحدة قوى . فلما تبع ذلك ان قطر من منخريه دم يسير اسود فى الخامس حقق ضعف قوته ولو كانت قوته أقوى واعراضه الرديئة أخف لقد كان موته يتأخر الى الثامن ونفسه كان الدليل على اختلاط الذهن على ما قيل فى ابيذيميا ، وعرقه البارد فى طول مرضه كان ينقص به قوته ولا ينقص به مرضه ، والحد الثانى الذى كان يحده فى خلال [٣] ذلك دليل على أنه لا ينبغى أن يثق بالراحة الحاسة بلا نقص بحران سبب له كائن فان الشدة تعاود فى مثلها [٤] سريعاً .

قد ذكر ما فى هذه القصة غير البول الذى فيه تعلق يشبه المنى وكل مافيها[٥] موافق لما فى كتاب تقدمة المعرفة والبحران وأيامه [بقية ابيذيميا عند هذه العلامة] .

٢٨ — الحسن الجهبذ كانت به علة شك فى أول الأمر أنها ذات

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(١) الأولى (٢) الاختلاط (٣) اخلال (٤) مثلهما (٥) فيه

اسهالا رديا وبول الدم ومثاله ابن سوادة .

(ابيذيميا)

المريض الأول من المقالة الأولى . هذا حم حمى حارة قوية الحرارة يومه كله ثم عرق ليلته عرقا كثيراً فلم تنقص عند ذلك العرق ولم يخفف عنه شيئاً من حماه لكنه كان ليلته كلها وفى يومه الثانى اشتد مابه من هذه الأعراض أكثر ثم حمل شيئاً (١) من حقنة (١) هذا اليوم فنزل به براز وخف ليلته أجمع ونهاره يوم الثالث الى نصفه فلما كان فى آخر هذا اليوم هاجت الحمى مع عطش شديد وجفوف الفم وعرق لا يخف الحمى به أصلا وتخليط وهذيان وبال فى هذه الليلة بولا اسود ثم كان ليلته صبيحتها اليوم الخامس والى انتصاف الخامس أخف . فلما كان بعد انتصافه قطر من منخريه قطرات دم يسير اسود (٢) وبال بولا فيه تعلقات مثل المنى مختلفة الشكل مستديرة وغير ذلك ولم يكن يرسب وصعب أيضا كل ما به ليلته (٣) صبيحتها السادس وبردت فيها أطرافه حتى لم يسخن إلا بالكد وقل نومه وبال بولا اسود وهذى فلما كان صبيحة اليوم السادس اسكت وعرق عرقا بارداً ثم اخضرت أطرافه نحو انتصاف النهار ومات وكان عرقه فى مرضه كله بارداً ونفسه عظيما متفاوتاً .

بانت دلائل الرداءة فى هذا المريض من أول ليلته الأولى وذلك انه كان يعرق فيها اجمع فلا تخف حماه بذلك . وقد قال بقراط إن الاشياء التى يكون بها البحران اذا كانت ثم لا تكن بها بحران فاما ان تكن تدل على الموت وذلك اذا كانت مع دلائل مهلكة أو على طول المرض وذلك اذا كانت مع دلائل السلامة . ومما ان حمى هذا ليس انما تخف بالعرق [ص ٢٤٤ ق]

(١) — (١) فه عيشه (٢) وسود (٣) ليله

بال دماً واختلف مرة خضراء دموية شبه غسالة اللحم الطرى وسقطت قوته . وأنكرنا عليه لأن علته كانت ساكنة هادئة ثم انتقلت فى ليلة واحدة إلى مثل هذه الحدة والشدة . وتوهمنا انه سقى شيئاً فلما كان عند العصر بال بولا أسود واختلف أيضاً من الأسود ومات صبيحة اليوم السادس وكانت به حصبة رديئة بالولية مائلة إلى داخل .

٢٥ — جاءتنى امرأة ببول أسود كالمرى وزعمت انه كان بها وجع فى صلبها وان ذلك الوجع قد سكن منذ أقبلت تبول هذا البول . وكانت قد بالته عشرة أيام حين جاءتنى وكان بها حمى ليلية كل ليلة بنافض والمرة سوداوية فاشرت عليها بما يدر البول .

٢٦ — امرأة[١] ابى[٢] عيسى أصابها قولنج شىء يسير فسقيت سهربا ران وسقيت بعده دواء فيه حرارة كثيرة وكان الوجع وجع فى الرحم وانما احتبست الطبيعة معه لوجع وورم فى الرحم يضيّق على الأعور ويشتد منه الوجع إذا نزل الثقل[٣] وامتنعت الطبيعة من ابراز الثقل[٣] لذلك . فلما سقيت هذه الأدوية جرى من قبلها شىء يشبه المشيمة . فامرت القابلة أن تتفقد صلابته وتحسه فكان رخواً عديم الحس فأمرت أن يشد بالفخذ قبين بعد يومين وأمرت أن يقطع مالم يحس منه وتناشأ آخر ثلاث مرات فقطع ثم برأت .

٢٧ — جارنا الشيخ المسلول مازال ينفث دماً كثيراً مدة طويلة ثم ان الأمر اشتد به فسقى بنادق مانعة من السعال تخف عليه كلما[٤] تداوى به اياما[٤] ثم مات ولم اكن متفقداً لحاله فى هذه * الأيام . فينبغى أن يمتنع من المانعة للنفث إلا حيث ينحدر ماله من الرأس ، وينبغى أن يمتنع من تضميد البطن فى الحصبة والجدرى فانه يضيق النفس على المكان ويورث

[ص ٢٤٤ و]

(١) مرة (٢) أبو (٣) — (٣) النغل فى المكانين (٤) — (٤) كل ماتدويدا أيام

ووجهه شديد الحمرة والانتفاخ وكان عبلا أحمر العين ممتلئ البدن . أمرت الطبيب المقرى أن يفصده الصافن ففصده الباسليق وأشرفت عليه فلم يصرع سنة .

٢٠ — جاءنى رجل قد تقيأ بعقب سكر مفرط قدر رطلين من الدم فوجدت عينيه محمرتين وبدنه ممتلئا ففصدته وامرته بلزوم القوابض فصح .

٢١ — كان رجل ينفث بالسعال دما [١] فأكل يوماً عصافيراً مقلية بزيت فنفث بعده بيوم نحو ثلاثة أرطال دم كدم المحاجم عجر كبار وخيف عليه . ورأيته بعد ذلك سليما إلا من السعال الدقيق الذى لم يزل به وأشرت عليه أن يجعل غذاءه سمكاً سرياً فاحتبس منه ما كان ينفث .

٢٢ — جاءنى رجل من أهل دارای الاقوال وبه داء الثعلب فى رأسه قدر أصبعين فأشرت عليه أن يدلكه بخرقة حتى يكاد يدمى ثم ادلكه ببصل ففعل ذلك وأسرف فى ذلك مرات كثيرة فنفط فأمرت أن يطلى عليه شحم الدجاج فسكن اللذع ثم تجاوز فنبت شعره فى نحو شهر أحسن وأشد سواداً وتكاثفاً من الأصل .

٢٣ — امرأة [٢] القصار وكيل ولد سعيد بن عبد الرحمن كانت امارتها امارات مستسقية ولم يمكن أن يتثبت فى النظر إليها . فاسقيتها ماء الفلافل حينا ودواء الكركم حينا . فبينما [٣] هى تغسل يوماً إذ انكبت على الاجانة فسال من قبلها قدر عشرين رطل ماء أصفر وخفت واستراحت مدة ثم [ص ٢٤٣ ق] أخذت [٤] أيضاً . واستقصيت خبرها بعد ذلك فصح عليها وكان بها علة فى الرحم وعالجتها بعد . وكانت تتوهم ان بها حبلا ولم يكن ذلك . فينبغى ان تعلم وتتفقد فان من علل [٥] الرحم علة تشبه الاستسقا .

٢٤ — بُنى بن سواده حم من حلقه صفراويه فلما كان فى الرابع مع الصبيح

(١) دم (٢) مرة (٣) فسما (٤) أحدث (٥) العلل

بغتة من غير استفراغ عادت العلة فمالت المرأة فيما [١] احسب الى الراحة فبردت أطرافها فسكن [٢] ذلك الوجع والورم وعادت العلة والاختلاط بأحدّ ما كان وأشده [٣] ثم أشرت عليه أن يكرر [٤] التغطية والتبريد واستفرغتها فبرأت .

١٦ — الحسن البواب حدث عليه نوبة علة حادة جداً وقد كان حار الكبد واندفع الى يديه ورجليه الفضل حتى عفيتا وسكنت الحمى فجربه على تلك الحال ، ففصده بعض الأطباء فعادت عليه شيء من الحدة والحرارة فانحلت قوته ومات بعد ثلاثة أيام .

١٧ — المرأة التى جاء بها إلينا أبو عيسى الهاشمى النحّاس كانت شحيمة رطبة جداً حدث بها فى الولادة [٥] فالج ثم صرع ولم يك فى أمرها لبس بل كانت دلائل صحيحة ساذجة فنقيتها [٦] بشربات قوية أخرجت البلغم وأمرتها بعد ذلك أن تلزم ترياق الاربعة فأعطاها الصيدلانى بدل ذلك انقرذيا [٧] فبرأت برأ عجيباً فعجبنا منه وسائر الأطباء .

١٨ - جارنا البزّاز فى درب النفل [٨] كان به صرع منذ صباه وكان نحيفا فحدست أن علته ليست من كثرة بلغم فأمرته بالقيء مرات ثم سقيته شربة تخرج السوداء بقوة فلم يصرع * ثلاثة أشهر . وجاءنا جيران الدرب يشكرونا ثم أنه أكل سمكا وشرب شرابا كثيراً فصرع ليلته تلك . فأعاد الشربة بعد القيء على ما كان يفعل فصلحت أيضا حاله وبقى يتعاهد القيء وتلك الشربة لا ينكر من نفسه شيئا إلى ان خرجنا من بغداد . وكان قد أسهل فى المارستان بشربات فلم ينفعه ذلك شيئا . [ص ٢٤٣ و]

١٩ — ورّاق نظيف المصروع تفرست فيه فرأيت وداجيه ممتلئة

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(١) فيها (٢) فسكنت (٣) واشر (٤) أن يكب
(٥) الولاد (٦) نعفتها (٧) انفردنا (٨) النقل

١٢ — ابن الحسين بن عبدويه كان[١] الأطباء يتوهمون لعظم بدنه أنه مرطوب جهلا منهم بين اللحيم والبدن الشحيم . وكان يهيج به شيء من وجع المفاصل ثم سقط فقصدته مرات وألزمته المسهل كل أسبوع مرة بما يخرج الصفراء لأن ذلك الخلط إنما كان صديداً حاداً وجعلت أغذيته الحامض والتفه[٢] والقابض ومنعته الحلو والحريف والدسم فخف ما به ولم يعرض منه إلا ما لابل به . ثم لما طال به هذا التدبير وبرأ[٣] البتة أقبل مع ذلك بدنه يخف من اللحم .

١٣ — كان بابن إدريس الاعورايات أرداً حمى شطر الغب الحدة فيها كثيرة وقد أزمنت والطبيب يسقيه أقراص الطباشير . فأشرت عليه أن يشرب ماء الشعير بعد السكنجبين ويؤخر الغذاء كل يوم إلى وقت الخف من الحمى وأن يتقيها فى وقتها ان أمكن وجدت له هذا من التدبير فاستصعب ذلك فقلت له ليس لك من التدبير إلا هذا فتدبر به أياماً وأنا غائب عنه فلقينى بعد عشرة * أيام وقد كمل خروجه منها البتة . [ص ٢٤٢ ق]

١٤ — كان بابن عبد المؤمن الصائغ غرب فأشرت عليه أن يحك الشياف التى ألفتها ويقطر فى الموق ففعل ذلك فبرأ به . وأنا أعلم أن ذلك ليس برأ صحيحا بل ضمر الناصور ويبسه فأما التحام فلا لأنى قد جربت ذلك مراراً لجالينوس فى النوادر كلام هو الذى بعثنى على تأليف هذه الشياف .

١٥ — كان بأمرأة جعدويه اخو حيدرة علة حارة فكنت أشير عليه كل يوم اذا جاءنى بالماء فجاء يوم وقال قد ظهر بها وجع وورم فى ثديها فأشرت عليه أن لا يبرده البتة وأن يدلكه وأعلمته أن ذلك انتقال باحورى وطفت[٤] العلة بذاك وأعلمته أنه ان سكن هذا الوجع

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(١) كانوا (٢) والنفق (٣) ناقص من الأصل (٤) وجفت

فيه بضربان فقال[1] شدّ مّا . وحدست ان به فى تلك الناحية ورم حار فقصدته[2] الابطى وأخرجت له قريباً من مائتى درهم فى مرة ثم سقيته ماء عنب الثعلب والهندبا ولب الخيار أياماً فبرأ حتى حين فصدت خف مابه يومه ذلك . وكان حدسى أن مادة العلة طفىء بعضها وانتقل بعض الى ذلك الموضع لانه لم يكن فيها استفراغ ظاهر .

١٠ — كان بالعبادى علة حارة ثم صارت منقلة ودام الماء على صبغه أياما كثيرة وكان يخف حيناً ويثقل حينا والماء لا يفارق صبغه والحمى تقلع وتعاود . فقصدته بعد مدة وصحت[3] الباسليق فاسرف الفاصد فى إخراج الدم فابيض بوله يومه ذلك وبرأ برءاً تاماً .

١١ — ابنة الحسين بن عبدويه شربت لبن اللقاح على العادة بلا مثورتى واذا نفخها اللبن أخذت دواء المسك ولم تكن تدمت له لافصد ولا مسهل فحمت حمى مطبقة[4] وظهر بها أمارات * الجدرى فجدرت [ص ٢١٢ و] جدرياً على جدرى أربع مرات . وحين بدأ الجدرى وفوضت تدبيرها الىّ بادرت إلى العين فوبتها بالكحل المحكوك بماء الورد فلم يخرج فى عينها شىء البتة على أنه قد كان حواليها[5] أمر غليظ جداً فعجب لذلك العجائز الذى كن حواليها من سلامة عينها وألزمتها ماء الشعير ونحوه مدة ولم تنطلق طبيعتها كما يكون بعقب هذه العلة . وبقى بها بقايا حمى حارة فحدست أن ذلك إنما هو لأن الخاط الباقى لم يخرج بالاسهال على العادة فلم يمكن أن استفرغها ضربة لضعف القوة . فألزمتها النقوع سحراً وماء الشعير ضحوة خمسة عشر يوماً فكان يقيمها كل يوم مجاسين فنقيت النقاء التام . وظهر النضج التام فى الماء بعد الاربعين وصح البرء بعد الخمسين .

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(١) فقال زائد فى الأصل (٢) فصدته (٣) وصحح (٤) منطقه (٥) حواليه

ألمت وألم باشتراكها الأعصاب الجائية إلى الرجلين لأن أعصابها قريبة من بعضها بعض وأن هناك ورم فى منابت تلك العصب فضمدت قطنه فلم يلبث إلا أياماً حتى حرك رجليه شيئاً شيئاً إلى غاية ما كتبت هذه القصة.

٧ — كان بأبى الحسين الخياط علة حارّة فخرج منها بعلاجى له ثم شكا إلىّ ضعف معدته فأسقيته أقراص الورد السنبلية فحم على المكان حمى حادة فتلاحقت تلك [١] منه بعد . . . . . .

٨ — هاج برجل معنا فى طريقنا حين قدمنا وهو أبو داود الذى كان يقود الحمار رمد فلما بدأ أشرت عليه أن يفتصد فلم يفعل واحتجم واخذ دواء كان معه فقطره فى أذنه قدر [٢] أوقية [٣] وأسرف وأنا أنهاه عن ذلك أشد * النهى حتى ضجرت ولم يقبل منى فلما كان من غد ذلك [ص ٢٤١ ق] اليوم اشتد الأمر به حتى لم [٣] أر رمداً أشد منه قط وخفت أن تنشق طبقات عينه وتسيل لأنه لم يتبين [٤] من القرنى شيء إلا مقدار العدسة لعلو ورم الملتحم . فلما أجهده الأمر فصدته وأخرجت له ثلاثة أرطال من الدم وأكثر من ذلك فى مرتين ونقيت عينه من الرمص وذررته بالأبيض فنام من يومه وسكن وجعه وبرأ من الغد البتة حتى تعجب الناس منه .

٩ — كان بخالد الطبرى علة حارة من تعب أصابه فسقيته ماء الشعير ونحوه حتى طفئت بعض الانطفاء . فهاج به وجع فى ناحية الخاصرة والحالب فتوهم الأطباء أنه قولنج وأرادوا أن يسقوه الجوارشات [٥] الحارة لأنهم قدّروا أن ماء الشعير أضرّ به على أنه قد كان بمعدته بقية من العلة الحارة. فحسست الموضع فوجدته حارا صلبا ثم سألته هل يحس

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(١) ذلك (٢) - (٢) قد وقيه (٣) ناقص من الاصل
(٤) بين (٥) الجوارشنات

الجهال من الاطباء يتوهمون انه قد حدث به لقوة من رطوبة لشدة صفر العين اليمين وتشنج هذه الناحية .

٤ — جاءنى رجل يشكو إلىّ خفقان فؤاده فوضع يدى على ثديه اليسار فاحسست بشريانه [١] الأعظم ينبض نبضاً لم أر مثله قط عظما وهولا . ثم مدّ يده اليسار ليريني باسليقه فاذ [٢] شريانه [٣] ينبض فى نابض العضد نبضاً أعظم ما يكون ظاهراً للحس جدا يشيل [٤] اللحم حتى يعلو وينخفض دائماً شيلا [٥] قويا ظاهراً وزعم [ص ٢٤١ و] أنه فصد الباسليق فلم ينتفع به وإنه إذا أكل أشياء حارة نفعه ، فتحيرت فى أمره مدة ثم أشرت عليه بعد أن بان لى بدواء المسك وقدرت فى هذا الرجل ان حاله فى النبض حال أصحاب الربو فى النفس فان هؤلاء على عظم انبساط صدورهم ما يدخلها من الهواء إلاّ [٦] قليل .

٥ — حدث بمحمد بن الحسين حكة وبثور ثم خرجت بثور فى إحليله خارج على الكمرة فخفت أن يحدث به ذلك داخلا فكان على ما ظننت حدث به ذلك وخرج قبل [٧] مدة .

٦ — كان بالقطان الطويل اللحية وجع فى معدته مزمناً فأشرت عليه يشرب شرابا صرفاً قويا فلما شربه انحط ذلك الوجع كله الى سرته واحتبس بوله ومثانته مملوءة . فوكّله بعض المائيين وأنا لا أعلم فاسرف فى ذلك مرة بعد مرة أعنى إدخال المبوّلة فجعلت مثانته بحالة حتى كان يخرج بلا إرادة وكان فيما يخرج خلط أبيض خام تدرّت أنه ذلك الذى نزل وكان شيئاً لحقن البول . ثم أصابه استرخاء فى رجليه جميعاً فلما بعث إلىّ جئته والأطباء يدهنون رجليه جميعاً بالأدهان الحارة . فحدست أن مثانته

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(١) بشيرنانه (٢) فاذا (٣) شيرنانه (٤) يسل (٥) شلا
(٦) ناقص من الاصل (٧) بياض فى الأصل مكان كلمة ولعلها (حدوثه)

تولد فيها نواصير وكان فصد فى ابتداء هذه العلة. فأزمنت به هذه المادة فى أذنه بسوء علاج الأطباء فلما انعقدت المادة بعضها على بعض فى صماخه حدث لذلك . . . . . (١) كما نفعله نحن بالفصد ليخرج الخراج فى أصل الأذن اذا أزمنت قرحة الأذن. فخرج الخراج فى أصل أذنه وقاح فصلح أذنه بعلاج فى آخر الأمر ثم انه ترك فيه بقايا من الخلط الردىء لأنه لم ينق من مرضه الأول باستفراغ قوى * لكى (٢) تميل المادة الى الأذن فقط . [ص ٢٤٠ ق] فاكل رؤسا فافرط وفى (٣) العنب فهاجت به حمى لازمة وغثى وكرب ويبس الطبيعة فسقى الفواكه والأشياء اللينة فتقيأها وصرت اليه فى اليوم الثالث فاذا قد هاج به صداع شديد وانحراف عن الضوء ودموع كثيرة وحمرة فى العين ففصدته ولم أخرج كثيرا من الدم للتوقف بسبب العامة . وعزمت على أنى أتى أين طبيعته من غد فخف أكثر مابه يومه ذلك ومن حفر اذنه أعراض السرسام وانى [كنت] أخاف أن يسرسم ، ثم انى لم أسقه دواء قوياً (٤) يسهله للتوقف أيضاً لا لغيره وسقيته الخيار شنبر ونحوه فلم يقمه البتة وأمرت أن يحقن ثلاثة أيام ولم أره فى هذه الأيام فرجعت وقد غاظ عليه جدا وخلط وكان الماء أشقر والوجه منتفخ ، فاردت ان أجر دما من أنفه فتوقفت أيضا من أجل العامة والرعاع لأنه لم يكن قبلى طبيب يرجع (٥) اليه بتة فلم يكن عندى فيه إلا ماء الشعير فسقيته ذلك طمعاً فى أن يلين وأمرته (٦) أن يسقى ماء القرع ولعاب البزرقطونا فقصر فى ذلك كله. فلما كان فى اليوم الرابع من هذا اليوم غاظ أمره وظهرت العلامات الرديئة صغرت إحدى عينيه وكان لسانه شديد السواد والخشونة ومات يومه ذاك فى الوقت الذى أنذرت بموته . وكان

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(١) بياض فى الاصل مكان كلمة (٢) لكن (٣) وفى العنب
(٤) قوى (٥) يرتجع (٦) وامراته

شبه ثقل معلق منه اذا قام[١] وأغفلت أنا أيضا أن أسأله عنه . وقد كان كثرة البول يقوى ظنى بالخراج فى الكلى إلا أنى كنت لا أحكم أن أباه أيضاً ضعيف المثانة يعتريه هذا الداء وهو أيضا قد كان يعتريه فى صحته فينبغى أن لانغفل[٢] بعد ذلك غاية التقصى[٣] ان شاء الله . ولما بال المدة أكببت عليه بما يدرّ البول حتى صفا البول من المدة ثم سقيته بعد ذلك الطين المختوم* والكندر ودم الأخوين وتخلص من علته وبرأ برأ تاماً [ص ٢٤ و] سريعا فى نحو من شهرين ، وكان الخراج صغيراً ودلنى على ذلك انه لم يشك الىّ ابتداء الثقل[٤] فى قطنه لكن بعد أن بال مدة قلت له هل كنت تجد ذلك قال نعم ! فلوكان كبيراً[٥] لقد كان يشكو ذلك ، وأن المدة نقيت سريعا فدل على صغر الخراج . فاما غيرى من الأطباء فانهم كانوا بعد أن بال مدة أيضاً لا يعلمون حالته البتة .

٢ — قصة علك الحاسب — جاءنى علك الحاسب فشكا إلىّ أن به قولنج ولم يفصح الوصف فأشرت عليه بالتمرى فأخذه[٦] فسكن عنه ثم أنه عاد عليه الوجع فى بطنه أياماً مع احتباس الطبيعة ثم أصابه بعقبه سحج خلط سوداوى مات منه وهو غائب عنى . فينبغى أن تعلم أنه قد يهيج بقوم وجع فى بطونهم شديد من مرار ردىء ينصبّ الى امعائهم فيعرض منه مثل القولنج[٧] وأثربه[٧] فيصيبهم بعقبه سحج شديد ردىء وخاصة أصحاب الطبائع السوداوية وكذا كان علك . فهؤلاء أسهلهم بدواء لين ثم اسقهم واحقنهم بالمغريات ان شاء الله وقد رأيت هذا فى غير موضع واحد .

٣ — قصة ابن عمرويه — كان هذا رجلا مستعدا[٨] للسرسام جداً وكان قد أصابه قبل قدومى سرسام فتخلص منه بان مال الفضل الى أذنه

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(١) نام (٢) يفعل (٣) اليقضى (٤) اثقل (٥) كثيرا
(٦) فاجد (٧) - (٧) واثربه (٨) مستبعدا

بسم الله الرحمن الرحيم

[ص ٢٢٩ ق]

« امثلة من قصص المرضى وحكايات لنا خلط نوادر فقط ، يرد الى ههنا مافيها من مسائل (١) ايذيميا وما فى ايذيميا (٢) من القصص (٣) ولا تؤخر ذلك ولا تتوانا فيه فان فيه نفعا عظيما جدا وخاصة فى (٤) المسائل فانا قد تهاونا بهذه الامثلة لأنا عزمنا على جمعها ههنا واذ اردنا (٥) ذلك فينبغى أن نجمع ايذيميا الى المسائل ونقرأه معاً ثم نكتب هاهنا على أتم ما يكون ان شاء الله »

١ — كان يأتى عبد الله بن سوادة حميات مخلطة تنوب مرة فى ستة أيام ومرة غب ومرة ربع ومرة كل يوم ويتقدمها نافض يسير ، وكان يبول مرات كثيرة . فحكمت أنه لا يخلو أن تكون هذه الحميات تريد أن تنقلب ربعاً واما أن يكون بهخراج فى كلاه ، فلم يلبث الا مديدة حتى بال مدة فأعلمته (٦) أنه لا تعاود هذه الحميات وكان كذلك ، وانما صدّنى فى أول الأمر عن أن أبتّ القول بأن به خراجا فى كلاه انه كان يحم قبل ذلك حمى غب وحميات أخر فكان الظن بأن تلك الحمى المخلطة من احتراقات تريد أن تصير ربعاً موضع (٧) قوى ، ولم يشك الىّ أن قطنه

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(١) المسائل (٢) ناقص من الاصل (٣) الفصص (٤) من
(٥) ازيدنا (٦) اعلته (٧) موضعا

قصص وحكايات المرضى

لمحمد بن زكرياء الرازى

(من كتاب الحاوى فى الطب)

[نقلا من النسخة المحفوظة فى خزانة الكتب « بودليان »
فى أكسفورد تحت حرف مارش ١٥٦]

المطبعة الرحمانية بمصر
بالموسكى رقم ٣٥ تليفون ٥١٥٢٢

Comenius and the Invisible College [1]

The work of the Royal Society in seventeenth century England is of such significance in the development of experimental science and in the recognition given this " new philosophy " that great importance is attached to any part of the life of that century which may help to explain the origins and growth of the Society. It has long been known that nearly a score of years before the Society obtained its charter, some science-lovers, or " virtuosi," were meeting informally first in London and then also in Oxford whither Parliamentary appointments had sent some of them. When the two groups came together again at the time of the Restoration, the Society was formally organized, receiving its charter from CHARLES II in 1662. The period of the first meetings of the Invisible College,—as that first group was called,—has been much discussed in regard to the scientific interests of the group as a whole and as individuals. But what the influences were that affected scientific work in the decade before these meetings began in 1645, and just why these particular virtuosi came together at that time are subjects less well understood. Various investigations, however, are now being made that may throw some light on these matters.

Recently a writer has placed great importance upon the visit of COMENIUS to England in 1641-2 as one of the hitherto less well-known influences leading to the formation of the Royal Society. The title of the book is worth quoting in full : *Comenius in England, the visit of Jan Amos Komensky (Comenius) the Czech Philosopher and Educationist to London in* 1641-1642, *its bearing on the Origins of the Royal Society, on the Development of the Encyclopaedia, and on plans for the Higher Education of New England and Virginia as described in contemporary documents,*

(1) Much of the material for this article was gathered while the writer was a fellow on the John Simon Guggenheim Memorial Foundation.

selected, translated and edited with an Introduction and Tables of Dates, by ROBERT FITZGIBBON YOUNG. In his introduction Dr. YOUNG writes: "The visit of COMENIUS to London in 1641-2 marks an important stage in the development in this country of the idea of a great institution for scientific research, which resulted in the organization of the 'Invisible Philosophical College' [*sic*] by THEODORE HAAK and others in 1645, and the foundation of the Royal Society in 1662." (2) These and similar statements led to a review of the evidence available about the genesis of the Society. As a result of this review, this study seeks to show that the Invisible College of 1645 was quite other than the great pansophic institution for which COMENIUS, backed by prominent statesmen and scholars, sought parliamentary support; that only one of COMENIUS's backers was a member of the Invisible College and that his most ardent supporter, HARTLIB, though a warm friend of many of the members then and later, was never himself a member; and that however much both COMENIUS and the Royal Society were influenced by BACON's *New Atlantis*, the Invisible College which was the Royal Society's "first beginnings" was no pansophic university carrying out the dreams of COMENIUS. Rather, it was merely a club of young men, some of the intelligentsia of that day, brought together by common college backgrounds and many common interests for rest and refreshment from the political, theological and military turmoil of the times. The close connections with similar groups on the continent have not hitherto been fully presented; but Dr. HARCOURT BROWN's book now in press presents correspondence between the virtuosi in England and those in France(3). In addition to probable European influences, the movement resulting in the formation of the Royal Society seems also more closely related to Puritanism than has hitherto been made clear; for that attack upon authority in the church and in the state had its effect upon authority in science also.

Only one of the ten documents in Dr. YOUNG's book on

(2) *Op. cit.*, pp. 6-7, Oxford Press 1932.

(3) *Scientific Organizations in Seventeenth Century France* (1620-1680), published in March, 1934 by WILLIAMS and WILKINS for the History of Science Society. Dr. BROWN kindly permitted the writer the use of his typescript in advance of its publication.

COMENIUS, the first and the most important, is new in English; for DAVID MASSON in his monumental life of MILTON (4) discusses most of the other documents in relation to MILTON's associations with SAMUEL HARTLIB, the sponsor of COMENIUS in England. The document newly translated is part of a treatise, *Continuatio admonitionis fraternae*, that COMENIUS wrote in 1669 to defend himself from attacks. The only known copy was found in 1913 in the Public Library at St. Petersburg. Dr. YOUNG believes it to have been based largely on COMENIUS's diaries, though it was written when COMENIUS was seventy-seven years old (5). In it COMENIUS gives an account of the development of his pansophic ideas. He tells also how in 1636 SAMUEL HARTLIB (1600-1662?), a wealthy German-speaking Pole living in London, hearing of his recent work along these lines through two young Czechs whom the Londoner had befriended, sent COMENIUS a generous subsidy and invited correspondence. The *Outline* of his *Compleat Wisdom* sent to HARTLIB came back to COMENIUS in printed form as *Praeludia Conatuum Pansophicorum Comenii*, having been printed at Oxford by HARTLIB because of the interest aroused in COMENIUS's theories. Finally HARTLIB urged COMENIUS so insistently to come to England to present his plans in person that COMENIUS arrived in September, 1641. He found that Parliament's attention had already been drawn to his ideas and those of JOHN DURIE in a sermon preached before it by Mr. GAUDEN, and that he had been invited by members of Parliament through HARTLIB. COMENIUS then quotes from that sermon the passage in which Mr. GAUDEN asks Parliament's favor " for the noble endeavours of two great and publique spirits, who have laboured much for truth and peace, ... COMMENIUS [*sic*] and DURAEUS... The one hath laide a faire designe and foundation for the raising up a Structure of Truth, Human and Divine, of excellent use to all mankinde, for the easiness and exquisitiveness of attaining the true knowledge of things. The other hath long studied, and with greate pains endeavured and wel advanced the peace and unity of the reformed churches."... (6) But the King was in Scotland, and only a

(4) MASSON : *Life of Milton*. (6 vols., London, 1881) vol. III, pp. 199-228.
(5) YOUNG, *Op. cit.*, p. 5.
(6) *Ibid.*, pp. 39-40.

handful of people were left to transact business. COMENIUS was invited to dine with the Bishop of Lincoln, who a few months later was to be appointed Archbishop of York. The bishop welcomed both DURIE and COMENIUS with HARTLIB and asked why COMENIUS had not brought his wife to England with him, at the same time offering him a yearly pension. COMENIUS reported that his wife was unwilling to come into exile with him, as she felt life in England would be. Unfortunately for COMENIUS the outbreak of war in Ireland upset Parliament's plans so that COMENIUS at length decided to accept an urgent invitation to visit Sweden. He therefore left England in June, 1642.

The men named by COMENIUS in this account as his " greater friends " or patrons in addition to HARTLIB and BISHOP WILLIAMS (1582-1650), were ROBERT GREVILLE, Lord BROOKE (1608-1643), JOHN SELDEN (1584-1654), JAMES USSHER (1581-1656), Archbishop of Armagh, JOHN PYM (1584-1643), and Sir CHENEY COLEPEPER (1603-1663), the latter a friend of BOYLE as the Bishop himself had been a friend of BACON (7). It is worth noting that most of these men were born in the 1580's in the middle of ELIZABETH's reign and that only one of them lived to see the Restoration. Other friends who welcomed COMENIUS when he first landed, as he states elsewhere (8), in addition to HARTLIB and DURY, were JOACHIM HÜBNER, from Cleves, a researcher for HARTLIB, JOHN PELL and THEODORE HAAK, all three young scholars with European experience.

Of all these men, old and young, only one, THEODORE HAAK (1605-1690), was named by his contemporaries as a member of the Invisible College. Dr. WALLIS, writing in 1696-7 (9) to supplement the account of this group which he had made in 1678 (10) credited HAAK with having suggested that the " College " meet in 1645. While JOHN PELL (1611-1685) was a skilled mathematician who later became a charter member of the Royal Society, he had scant opportunity in the late forties and early fifties to be with the virtuosi himself for he was much

(7) *Ibid.*, pp. 42, 44, 46.

(8) *Ibid.*, p. 64.

(9) " Dr. WALLIS's account of some passages of his own life, January 29, 1696-7," in T. HEARNE : *Works* (4 vols., London, 1810), vol. III, p. clxii.

(10) WALLIS : *Defence of the Royal Society* (London, 1678), pp. 7-8.

on the continent first as Professor of Mathematics in Amsterdam and at Breda and then as an envoy for CROMWELL to the Swiss cantons. With these exceptions of PELL, HAAK, HÜBNER and HARTLIB, the friends and patrons of COMENIUS were of an older generation and were most of them men of great prominence in the state by reason of their birth and their position. They were well chosen as the patrons for a great state-supported college with universal knowledge for its province; for their rank, their standing as men of learning and affairs and their prominence politically and socially would reflect glory upon the proposal and draw supporters to it.

Let us turn now to the Invisible College—to use BOYLE's name (11) for the little group of friends that was meeting weekly in London in 1645 to discuss the new philosophy. In the earliest (12) account of the College, Dr. WALLIS names seven members—WILKINS, GODDARD, ENT, SCARBROUGH, GLISSON, MERRIT, HAAK—besides himself and says there were some others also. One of these others almost certainly was BOYLE, for a few months later BOYLE writes proudly of the work " our " group was doing. Although in his first account WALLIS does not include SAMUEL FOSTER's name as a member, he does name him in 1696. Furthermore he remarks in his first statement that the group met in FOSTER's rooms at Gresham College until his death in 1652, and that they continued on there in the rooms of his successor LAWRENCE ROOKE. It is possible therefore to count FOSTER as a tenth member of the Invisible College. As professor of mathematics at Gresham College he logically belongs.

A study of these ten men (including BOYLE, FOSTER, and WALLIS) to ascertain their ages in 1645, their college backgrounds, their theological or political positions and the field of their business or professional interests brings to light certain interesting facts. The range in age of the group in 1645 is from 18 (BOYLE) to 48 (Dr. GLISSON) and five of them are from 28 to 31. In other words these men were definitely of the STUART times, born with two exceptions long after ELIZABETH had died. This is the

(11) BOYLE : *Works* (ed. Birch, 6 vols., London, 1772), vol. I, p. xxxiv.

(12) WALLIS : *Defence*, pp. 7-8. SPRAT's *History of the Royal Society* (London 1667) places the first meetings at Wadham College, Oxford, during the Commonwealth (p. 53).

first point of contrast between the Invisible College group and the much older men who had supported COMENIUS.

Of significance also are their common college backgrounds. BOYLE had gone abroad after three years at Eton. The other men were all university trained and had been in college with one or other of their number. WILKINS and GODDARD had each overlapped the other's term at Magdalen Hall, Oxford, in the early thirties. MERRIT and HAAK had done the same at the same time at Gloucester Hall, the other Puritan center in Oxford. ENT, WALLIS, GLISSON, SCARBROUGH and FOSTER were Cambridge men, WALLIS and FOSTER from Emmanuel, the Puritan foundation there, GLISSON and SCARBROUGH from Caius College (from which HARVEY had graduated some years before). Later SCARBROUGH went on to Merton at Oxford. ENT had followed Cambridge with Padua. It seems more than a mere coincidence that in this group of ten there should be two men from each of four colleges, and that three of the colleges should be the ones noted for their Puritan leanings and the fourth for its strongly medical trend.

Among the ten were two divines keenly interested in mathematics, a professor of mathematics, five doctors of medicine who also had other scientific interests, HAAK a translator, and BOYLE who was a "gentleman." SCARBROUGH was the Royalist of the group, the others having recognized Puritan tendencies and, some of them, Parliamentary appointment later. FOSTER, the professor of mathematics at Gresham College, because of his death in 1652 of course was not on the Royal Society list ten years later, but the others were all among its charter members.

Clearly, then, these were young professional men of the middle class, well educated and eager about the interests that had brought most of them to London in the early sixteen-forties. WILKINS was there as chaplain to the Prince Elector Palatine while he was in England. WALLIS, having served as secretary to the assembly of divines at Westminster the preceding year, had been awarded by Parliament a fellowship at Queens College, Cambridge, but in 1645 married and moved to London. Dr. GLISSON was already an authority on rickets and had a professorship at Cambridge, not moving to London from Colchester to live until 1648. THEODORE HAAK, a Calvinist refugee from the Palatinate, had come to England in 1625 when twenty years old, and after

several years at Oxford broken by a visit in Europe, had been employed by the Westminster Assembly to translate into English the Dutch annotations on the Bible. He was later given by Parliament the sole right of translation for fourteen years from the time of publication, together with a pension (13). It was HAAK who according to WALLIS first suggested the meetings of 1645 (14). And it was HAAK who had joined with HARTLIB in welcoming COMENIUS to England four years earlier.

Why then, if COMENIUS's visit resulted in the organization of the College, did WALLIS in 1678 in his defence of the Royal Society fail to mention HAAK's initiation of it and instead why did he emphasize the important part WILKINS played in the group, an importance borne out by the records of WILKINS' later activities at Oxford, Cambridge and in London from the very first meeting of the Royal Society? Do not informal club groups need the leadership of attractive personalities interested in their fellow-men as well as in their common intellectual pursuits? WILKINS from all accounts was preeminently such a tactful winning person, wherever he went forming the center of a group of eager minds and hailed by the younger men like HOOKE and CHRISTOPHER WREN as their great friend and patron (15). Furthermore, WILKINS had already published two books on scientific subjects (the first appearing in 1638). A third, *Mathematicall Magick*, he states (16) was written in the early forties, and it was probably available then in manuscript although it was not published until 1648. Of the group named as members of the Invisible College in 1645, the Prince Palatine's chaplain was probably the best known by virtue of his personality, his official standing and these publications.

As a matter of fact also, it is now being claimed that THEODORE HAAK was of far greater influence in these early days than has hitherto been recognized, despite WALLIS's having credited him with suggesting the first meetings of the Invisible College. In his

(13) *Dictionary of National Biography*, "HAAK," "GLISSON," "WALLIS."

(14) In HEARNE: *Works*, vol. III, p. clxiii.

(15) STIMSON: "Dr. WILKINS and the Royal Society," *Journal of Modern History*, (Dec. 1931), vol. III, No. 4, pp. 539-563.

(16) WILKINS: *Mathematical Magick* (5th edition, London, 1707), "Dedication."

forthcoming book on the scientific societies of seventeenth century France, Dr. HARCOURT BROWN calls attention to the correspondence between the French Minorite, Père MERSENNE (1588-1648) and HAAK on scientific matters that began as early as 1639 and shows HAAK even then as a channel of communication between the science-lovers of France and of England (17). If it was the influence of COMENIUS upon HAAK that had stimulated him to suggest the Invisible College, why did he delay doing so until three years after COMENIUS had left England? The true influences upon HAAK and upon the Invisible College seem to be the same ones that were stimulating similar groups of science-lovers on the continent, whether in Florence at the Cimento or in France in the Cabinet of the brothers DU PUY and in MERSENNE's circle,—a desire to promote natural knowledge by experimental methods, combined with the leadership and the patronage of strong personalities.

It seems, therefore, that the Invisible College met in 1645 not because COMENIUS had visited England but because some young professional men with common interests and backgrounds and rather close if not conspicuous connections with the momentous questions of the day, being weary of those same problems, sought recreation and refreshment weekly in philosophical inquiries at a small informal club; as WALLIS says, " where (to avoid diversion to other discourses, and for some other reasons) we barred all Discourses of Divinity, of State-Affaires, and of News (other than what concern'd our business of Philosophy)..." (18) In modern phrasing they barred shop-talk, politics and the latest news from the front; for 1645 saw the battle of Naseby and civil war had already been in progress for three years. What really interested them were the subjects they had perhaps been discussing in the universities and with their friends on the continent and at home, such matters as recently published books and newly devised instruments—topics comparable to those HAAK and MERSENNE had been writing about for at least six years before the College began its meetings.

Why they avoided the topics they banned can be easily inferred

(17) BROWN : *Op. cit.*, chap. 3, and appendix A.
(18) *Defence*, p. 7.

from the vivid autobiography of one of their contemporaries. RICHARD BAXTER, the noted non-conformist divine, writing in 1664 about his experiences twenty years or so earlier, states: "While I lived here [Coventry in 1643] in Peace and Liberty, as Men in a dry House to hear the Storms abroad, so did we daily hear the news of one Fight or other, or one Garrison or other won or lost... So that hearing such sad news on one side or other was our daily work; insomuch that as duly as I awakened in the morning I expected to hear one come and tell me 'Such a Garrison is won or lost...' And 'do you hear the news' was commonly the first Word I heard..." (19) After Naseby, BAXTER visited CROMWELL's army, and finding what he thought to be a dangerous shift in its members' opinions he deemed it necessary to serve as preacher to the troops; for, he wrote: "they made it too much of their Religion to talk for this Opinion or for that; sometimes for State Democracy and sometimes for Church Democracy; sometimes against Forms of Prayer, and sometimes against Infant Baptism (which yet some of them did maintain); sometimes against Set-times of Prayer, and against the tying of ourselves to any Duty before the Spirit move us; and sometimes about Free-grace and Free-will and all the points of Antinomianism and Arminianism... But their most frequent and vehement Disputes were for Liberty of Conscience, as they called it; that is, that the Civil Magistrate had nothing to do to determine of anything in Matters of Religion by constraint or restraint, but every Man might not only *hold* but *preach* and *do* in Matters of Religion what he pleased. That the Civil Magistrate hath nothing to do but with Civil Things, to keep the Peace, and protect the Church's Liberties." (20) In the face of such discussions by CROMWELL's troopers surely the Invisible College did well to bar all "Discourses of Divinity, of State Affaires, and of News." We who have lived through the years 1914-1918 have some comprehension of the bitter weariness of fratricidal dissensions and of the pressing need at such times for less inflammable topics of conversation.

(19) *Reliquiae Baxterianae: Or Mr. Richard Baxter's Narrative of the Most Memorable Passages of his Life and Times*, published by Matthew Sylvester, (London, 1696), p. 46.

(20) *Ibid.*, p. 53.

The approach to truth and knowledge taken by the Invisible College was definitely through experimentation. In 1645 WILKINS and his friends at their weekly meetings " discoursed the Circulation of the Blood, the Valves in the Veins, the Copernican Hypothesis, the Nature of Comets and new Stars, the Attendants on Jupiter, the Oval shape of Saturn, the Inequalities and Selenography of the Moon, the several Phases of Venus and Mercury, the Improvement of Telescopes, and Grinding of Glasses for that purpose... the weight of the Air, the Possibility or Impossibility of Vacuities, and Nature's abhorrence thereof, the Torricellian Experiment in Quicksilver, the Descent of Heavy Bodies, and the Degrees of Acceleration therein, with others of like nature. Some of which were but new Discoveries, and others not so generally known and embraced as now they are." (21) Possibly the following passage from WILKINS's first book *Discovery of a World in the Moone* illustrates the vigor with which these new topics would be discussed : " But here's the mystery of it, wee first tie ourselves unto ARISTOTLE's Principles, and then conclude that nothing could contradict them but a miracle, whereas twould be much better for the Common-wealth of learning, if we would ground our Principles rather upon the frequent experiences of our owne, then [*sic*] the bare authority of others." (22)

COMENIUS, on the other hand, whatever his interest in nature as a part of his educational program was absorbed in the study of language as the gateway to knowledge. And science to him was knowledge. The education of all children regardless of sex or of condition was his concern, and his aim " was to simplify and shorten, by a kind of royal road to learning, all studies, arts and sciences." (23) How best could the program of the schools be modified, particularly through the study of languages learned in relation to real objects, and the schoolroom be freed from the pedantry of mediaeval scholasticism? Though the study of nature had value and a place in his educational system,

(21) WALLIS : *Defence*, pp. 7-8.

(22) WILKINS : *Discovery of a World in the Moone* (London, 1638), p. 175. [A printer's error : should be p. 177.]

(23) CROSSLEY, quoted by DIRCKS : *A Biographical Memoir of Samuel Hartlib, Milton's Familiar Friend* (London, 1865), p. 52.

COMENIUS's own interest was not in exploring the new regions opened up by GILBERT, GALILEO, TORRICELLI, HARVEY and many others. Greatly as BACON's *Novum Organon* may have influenced his thinking, he seems to " have failed to appreciate that the one important point in the Baconian philosophy was the insistence on experiment and verification as a basis for sound induction." (24) Thus in his *Great Didactic* where he discusses the proper teaching of the sciences, of the arts, of morality and of piety, he defines science as the knowledge of nature through internal perception derived from the object to be observed and the light by which to observe it. " Therefore the youth who wishes to penetrate the mysteries of the sciences must carefully observe four rules: He must keep the eye of his mind pure; he must see that the object be brought near to it; he must pay attention; he must proceed from one object to another in accordance with a suitable method. For thus he will apprehend everything surely and easily." (25) Thus should science be taught in the schools. As the culmination of this graduated course of instruction the ablest should proceed to the School of Schools or Didactic College where learned men would work together " to thoroly establish the foundations of the sciences, to spread the light of wisdom throughout the human race with greater wisdom than has hitherto been attained, and to benefit humanity by new and useful inventions; for unless we wish to remain stationary or to lose ground, we must take care that our successful beginnings lead to further advances... This University College therefore will bear the same relation to other schools that the belly bears to the other members of the body, since it will be a kind of workshop, supplying blood, life and strength to all." (26) Yet COMENIUS sought to refute the Copernicans and the Cartesians, for his friend PELL wrote (probably to HARTLIB) about COMENIUS's loss of his papers in a fire: " I should have been willing to read over his refutations of the Copernicans and Cartesians but with that prejudice that I do not believe him to be a competent judge of all the differences

(24) KEATINGE: *The Great Didactic of John Amos Comenius*, trans. into Eng. and edited with biographical, historical and critical introductions (two parts, London, 1921), Part I, p. 36.

(25) *Ibid.*, Part II, chap. 20.

(26) *Ibid.*, Part II, chap. 31.

between them and other writers. And therefore of all his papers, there is none for whose loss I am less sorry" (27)... Verification, the essence of the experimental method, nowhere appears in the *Great Didactic* where COMENIUS discusses the place of the sciences in the schools. On the other hand, verification lies at the basis of the work of the Invisible College; and the motto of its successor, the Royal Society, "Nullius in Verba," reflects the virtuosi's rejection of authority unsupported by experimental evidence. The virtuosi were eager to investigate for themselves the recent discoveries of GALILEO, TORRICELLI, HARVEY and the other brilliant workers of that age. So quite naturally it is the bust of FRANCIS BACON, the exponent of the inductive method,—not that of COMENIUS—that appears in the frontispiece of SPRAT's *History of the Royal Society* in 1667, the account officially approved by the Society itself; and it is BACON's name rather than that of COMENIUS that figures repeatedly in the writings of these men as the source of their inspiration (28).

If COMENIUS's visit really had resulted in the formation of the Invisible College, why was not SAMUEL HARTLIB, COMENIUS's friend and sponsor in England, an important member; particularly since HARTLIB was well known to many of the members, as for example BOYLE, WILKINS, PELL, and PETTY? Not only is HARTLIB not mentioned in the contemporary accounts of the Royal Society and its origins, but his biographer considers it very doubtful that he was ever connected with the Society for "he was not an experimentalist and was an unlikely person to have original views" on the subjects discussed (29). DIRCKS continues: "His correspondence with its several members does not confirm the supposition that it was organized on any plan of his suggesting, and assuming the contrary, his own silence on the subject is the more remarkable, for success was not the crowning feature of the many benevolent schemes he suggested; although on the other hand, much is due to his untiring energy in keeping alive designs he had in view and inciting in others the same ambition to carry them into effect under more favorable circumstances even after his own career of usefulness should be brought to a

(27) *Ibid.*, Part I, p. 88.
(28) SPRAT, *Op. cit.*, p. 35.
(29) DIRCKS: *Op. cit.*, p. 20.

close." (30) In a letter to Dr. WORTHINGTON soon after the first meetings for the Society's organization (December 17, 1660), HARTLIB wrote: " at least the Author and Founders walking in the Light, we shall know from Time to Time how this proposed Affair is Managed by Them. Lord SKYTTE, a Swedish nobleman of Senatorian Rank in that Kingdom, is one; who it seems, hath devoted the spending of his Life and Estate after this Manner. His Excellency (for so he is called) sent me Word that shortly he would wait upon me, which I dare not own; but I suppose he intends to come and see me in my own Lodging. If he does so, I suppose I shall know the whole Design more fully. I received the Papers without Explication; so that I do but guess, that one of the Papers contains the Propositions which were made to his Majesty by the Lord SKITTE, and the other a Draught for the Royal Grant or Patent which is desired for the establishment of this Foundation. Thus much is certain, that there is a Meeting every Week of the Prime Virtuosi, not only in Gresham College in Term Time, but also out of it at Mr. BALL's Chamber in the Temple. They desired his Majesty's leave, that they might thus meet, or assemble themselves at all Times; which is certainly granted. BOYLE, Sir PAUL NEALE, Viscount BROUNCKER are some of the members. WREN is chosen Register (31). I look upon this Society as a previous Introduction of the Grand Design here represented. His Majesty is said to profess himself one of these Virtuosi." (32) Such a letter indicates interest and knowledge, even sympathy, but certainly not consideration by the writer himself as one of the group about whom he is writing, or surely he would have written " we " instead of " they " (33).

(30) *Ibid.*, p. 20-21. Dr. JOHN FULTON in his " The Rise of the experimental Method " (*Yale Journal of Biology and Medicine*, March 1931, p. 305) has listed HARTLIB among the virtuosi meeting in 1645; but the evidence does not support this assertion of membership.

(31) At that first meeting not WREN but CROONE " though absent " was chosen register. BIRCH : *History of the Royal Society* (4 vols., London, 1756-57), vol. I, (Nov. 28, 1660); SPRAT, *Op. cit.*, p. 94.

(32) KENNET : *A Register and Chronicle Ecclesiastical and Civil, containing Matters of Fact, Delivered in the Words of the most Authentick Books, Papers and Records, Digested in Exact Order of Time* (London, 1728), p. 868.

(33) Later HARTLIB wrote to WORTHINGTON (Jan. 1, 1660-1); " Lord SKYTTE desires to come to me to confer about his Design. He is one of the Virtuosi; so is Mr. BRERETON. Mr. BOYLE, one of them, told me that for the present they

Besides not being himself one of the Royal Society fellows, HARTLIB had a dream of his own for various parts of which he sought support throughout the twenty years of his life that followed the publication in 1641 of his ideal commonwealth. In His *Description of the Famous Kingdom of Macaria* according to his biographer (34) he dreamed of a happy region where would be united " the great, the wealthy, the religious and the philosophical " and where there would be formed a " common centre for assisting and promoting all undertakings in the support of which mankind was interested." Later on he centered his attention on a college of husbandry, which was part of the general scheme. Furthermore he planned a college called " Antlantis " described in his *Memorial for the Advancement of Universal Learning*, and he offered with JOHN DURY to receive in trust any sums of money for this purpose that well affected persons and lovers of the public good were pleased to give. It seems likely that these schemes were the ones for which BOYLE offered encouragement in the following (undated) letter to HARTLIB : " I am sure that you have too much charity to want justice; and therefore on the score of your promise I am bold, not only to desire, but to expect at your hands a *Mercurius Philosophicus*, in an account of the projects and successes of that *college*, whereof God has made you hitherto the midwife and nurse... And since you do not disdain the meanest workman, that is but willing to lay some few stones towards the building of your *college*, I shall in my following epistles (If this procure them a pass) take the liberty to acquaint you with what thoughts and observations of mine I shall judge useful in reference to so glorious a design; to which I shall think it very much my happiness, if any endeavours of mine can have the honour in the least measure to contribute, not only as they owe a duty to the public (though I must confess, that of itself a very prevalent motive) but because I know you so vastly affectionate to that public, that my invention will furnish me with no fitter way, than that of my services to

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are removed from Gresham College to Dr. GODDARD's Lodgings. He offers to contribute to it." Three months later he added (April 2, 1661) : " There comes nothing of Lord SKYTTE's Business, and I believe the other Virtuosi will not have it that it should go forward." KENNET, *Op. cit.*, pp. 868, 870.

(34) DIRCKS : *Op. cit.*, pp. 16-18.

it, to give you real and accepted testimonies of my being, etc." (35) And HARTLIB probably had these same plans in mind when he wrote to Boyle on August 10, 1658 complaining that WILLIAM PETTY's proposals for a college had cost him some £ 250 a year, " by undermining that more universal design for learning upon which I have been made to hope these two years." (36)

In an age that dreamed of a New Atlantis and of the possibility of new worlds in the moon, when thoughtful men like EVELYN and PETTY were suggesting schemes for the extension of knowledge, and when even the Commonwealth parliament was considering the advisability of reorganizing the old universities and of establishing a new one at Durham, the dreams of COMENIUS would seem to harmonize more with those of HARTLIB than with the philosophical pursuits of the virtuosi belonging to the Invisible College. Hence WALLIS's account still stands as the authentic version of the meetings in 1645, supported as it is in many details by AUBREY and ANTHONY WOOD. As WOOD wrote, those meetings began " not as a foundation for a Society but merely for diversion sake in an innocent and virtuous manner." (37) That HAAK who knew COMENIUS was the one to suggest the meetings seems a coincidence rather than a connection, particularly in the light of HAAK's previous years of correspondence with the French science-lovers through MERSENNE, and in view of the fact that HARTLIB, COMENIUS's chief sponsor in England, was not one of the virtuosi. It does not seem probable, therefore, on the basis of the existing evidence that the visit of COMENIUS to England in 1641-2 marks an " important stage in the development of the idea of a great institution for scientific research " (38).

How far in the years before the Civil War the Puritan temper found an outlet for its vigor in scientific investigation as well as in political and theological discussion is a problem requiring the review of much more evidence than it has been possible to present in this brief study. Mention is made of this theory only to

(35) BOYLE : *Op. cit.*, vol. I, pp. xlvi-xlvii.

(36) *Ibid* : vol. VI, p. 113.

(37) WOOD : *History and Antiquities of Oxford* (edited by GUTCH, 2 vols., Oxford, 1786), Vol. II, Part II, pp. 632-33.

(38) YOUNG : *Op. cit.* pp. 6-7.

suggest an influence for the advancement of scientific work in England of far more importance, perhaps, than the educational theories of COMENIUS.

Goucher College. DOROTHY STIMSON.

Some features of the History of Medicine in Massachusetts during the colonial period (1620-1770) (*)

Introduction

If the seventeenth century was " the greatest of centuries " from the scientific point of view, the age of supreme individual endeavor in medicine, with William Harvey the outstanding personality, little of this reached America; there was no eminent physician in New England before 1720 and no scientific work of importance was accomplished during this era. The few physicians who came to America were forced by the environment to serve as bedside doctors in a hard-bitten country without any of the European refinements. There were no academies of medicine, no Royal Society to publish their transactions, not even a pharmacopeia or a textbook. A single sheet of paper, Thacher's " Brief Rule," was the only publication in this country of any medical importance during this period. A few lectures on anatomy, an endeavor towards public health measures by quarantine of Boston harbor, at the end of the century an act to control infectious diseases, and a few regulations for the practice of medicine are all that can be found to indicate intellectual advancement in the physician's art. The country was visited again and again by plague, smallpox, diphteria and yellow fever. In spite of regulation, many died of exposure to the rigorous climate and only the strongest survived the pioneer conditions and the assault of the various " fevers."

(*) Read before the Joint Session of the History of Science Society and Section L, American Association for the Advancement of Science. Cambridge, Mass., December 29, 1933.

Medicine was promulgated, for the first hundred years of colonial America, by three types of individuals : the governors, the churchmen and the educators. This was the period of " bleed and pray " and nothing but the crudest methods of treatment were employed until well into the eighteenth century. Every effort to serve the public, however, was made by the more educated groups and perhaps it was not any more badly cared for than the European populace; at least much of the quackery so prevalent in the seventeenth century in Europe was absent. The physician, whether minister, governor, or schoolmaster, was not carried away by the superficiality of much that was obvious in the medicine of the time in New England. Each learned the art of practice by actual bedside instruction from his predecessor, prepared his drugs, even did his housework. There was no marked differentiation between physician and surgeon, the cause of so much antagonism in Europe. When an emergency arose, the doctor was expected to handle everything from the treatment of wounds and fractures to reducing hernias or caring for patients with " fever." From the very beginning, therefore, there was an eminently practical tendency towards emperic medicine.

The Seventeenth Century

Coming over on the *Mayflower*, landing in Plymouth in 1620, was Deacon " Doctor " Samuel Fuller (1580-1633), apparently a physician of considerable ability, (1) as well as Giles Heale, a barber-surgeon serving among the crew. Fuller's education in medicine is not clear from our knowledge of him. He formed a warm friendship with William Bradford and William Brewster, went to Holland and there may have studied in the University of Leyden, or at least probably visited the famous Botanic Gardens and learned something about medicinal herbs. Public anatomies were also open to him. Apparently he did not take a medical degree, although he was often referred to as "Doctor" Fuller by the men of the Massachusetts Bay Colony. He appears

(1) Harrington, Thomas F. Dr. Samuel Fuller, of the Mayflower (1620), the pioneer physician. *Bull. Johns Hopkins Hosp.*, 14, 263-270, 1903.

to have been well educated in clerical matters, although his profession was really medicine and it was as a physician and not as a minister that he came to this country. The voyage of the *Mayflower* was comparatively free from serious sickness, only two of the seamen dying. FULLER, moreover, lost his apprentice, WILLIAM BUTTON, two days before land was sighted.

All this was changed, however, during the first winter at Plymouth, when about half the Pilgrims died, perhaps from an epidemic of an infectious disease similar to that which had killed so many of the local Indians a few years before. FULLER was a very active colonist, for he not only looked out for illness in the Plymouth Colony, but made various trips inland and assisted in the settling of the outlying districts. He also planted his own land, built his own house, and was generally considered one of the leading citizens of the small band. Within twelve years he was well known to the Salem and Boston colonists, for he traveled frequently among them. His fame was such that when JOHN ENDICOTT arrived in Salem, he wrote to WILLIAM BRADFORD asking for FULLER's services, having heard of his curing many of scurvy and other diseases. JOHN WINTHROP, too, in Boston, needed FULLER's advice and apparently FULLER acted as liason officer between the three settlements. FULLER's wife practised midwifery, probably the first to do so in the Colony.

With or without a degree FULLER appears to have done his work well; he carried out his duties to his church and to mankind in a manner worthy of his profession, a respected leader and skillful physician. Working with scant resources, he cared for the sick and served to establish a bond of goodwill among the scattered colonies, a bond which helped establish permanently, plantations which might easily have otherwise failed. His position as a physician made possible his journeyings; his high character made him a trusted messenger; his ability and friendliness brought ENDICOTT, WINTHROP and BRADFORD into closer accord.

Little is known of GILES HEALE, who came over as the surgeon to the crew and who returned on the *Mayflower* in April 1621 to practice in London where he died in 1653.

After FULLER's death in 1633, the Colony seems to have imported few other physicians and depended upon their magistrates and

teachers for medical advice. The outstanding members of the governing class who were acknowledged as physicians in the early years were the two WINTHROPS (2). The elder JOHN WINTHROP was in frequent communication with London and apparently often asked his friends in England for advice on medical topics, realizing that trained physicians were one of the great needs of the Colony. In 1643 he received from London eight pages of notes on herbs and their uses in curing disease, sent to him by EDWARD STAFFORD (d. 1651), probably the son-in-law of ELIAS ASHMOLE, the great Oxford collector. Most of this material was taken from JOHN GERARD's *Herball*, first published in 1597, the most popular of all the English herbals, a second edition, greatly enlarged, having been published in London ten years before STAFFORD's letter. WINTHROP, largely through the medium of writing letters, applied the knowledge gained by these notes to advising his people. Some of these letters are extant (3), now in the Boston Medical Library, and they show the type of advice asked for and the answers written by WINTHROP. Actually untrained in medicine and having only slight assistance in making a diagnosis through a description written by an uneducated person, WINTHROP was forced to rely upon drugs, and his letters are full of recommendations for various ointments, nauseous remedies, cupping, plasters and baths. That the patients had the hardihood to withstand the assault of these various remedies speaks well for the sturdiness of the Massachusetts Bay colonists. WINTHROP's son, JOHN WINTHROP THE YOUNGER, carried on a similar correspondence with his people in Connecticut (4).

Next to the governors, the ministers were the leading practitioners of medicine. SAMUEL FULLER, although never strictly speaking, a minister should, perhaps, be considered the outstanding man of this group. The " angelical conjunction " between the offices of minister and physician, referred to later by COTTON MATHER, was best exemplified in the person of THOMAS

(2) BROWNE, C. A. Scientific notes from the books and letters of JOHN WINTHROP, JR., (1606-1676). *Isis*, 11, 325-342, 1928; (genealogical table on p. 342).

(3) HOLMES, OLIVER WENDELL. *Proc. Mass. Hist. Soc.*, 5, 379-399, 1860-1862.

(4) VIETS, HENRY R. A Brief History of Medicine in Massachusetts. Boston, 1930, (pp. 23-27).

THACHER (1620-1678) (5), the outstanding Puritan preacher-physician of his time. Coming to this country at the age of fifteen, he received his early education under the tutelage of CHARLES CHAUNCY (1592-1672), an impoverished pastor of the church at Scituate, later to become the second president of Harvard College. THACHER's education was liberal, including Hebrew, Arabic, and what was known as "the elements of medicine." In 1669 he was chosen pastor of the Third or Old South Church in Boston, but while in this position he devoted much of his time to the practice of medicine and was regarded by his fellow colonists as the most eminent physician in Boston. The year before his death (1677) he wrote a short article on smallpox and measles, the first medical paper to be published in America (6). It was only a single sheet, but it has a certain amount of importance as it was actually an abbreviated extract from the writings of the English physician, THOMAS SYDENHAM (1624-1689). THACHER disclaimed all originality and took pains to inform his readers that he was not a physician; that he selected a good model for his "Brief Rule" is to his credit. The leaflet was designed as a broadsheet for circularization to the public during an epidemic of smallpox in Boston in the winter of 1676-77. SYDENHAM's sound commonsense is evident throughout and this document is clearly a distinct advance on the work done by FULLER and the WINTHROPS. SYDENHAM, by throwing aside all medical theorizing, was the first of the great modern clinical physicians. He wrote firsthand accounts of diseases, separating scarlatina from measles and describing malarial fever, gout, dysentery and chorea. If THACHER had not been towards the close of his life when he published his "Brief Rule," no doubt he would have taken advantage of SYDENHAM's later works, which appeared in the last twenty years of the seventeenth century, in England. THACHER died the next year (1678) and no one else in America saw the great advantage of the publication of broadsides as a means of

(5) BOLTON, CHARLES KNOWLES. The Founders. Portraits of PERSONS BORN ABROAD who came to the Colonies in North America before the year 1701. 2 vols. Boston, 1919; (biog. of THACHER, vol. 2, pp. 487-8; portrait, p. 489).

(6) Reprinted in VIETS' *Brief History* (4), pp. 29-34. *Also:* HANDERSON, H. E. The earliest contribution to medical literature in the United States. *Janus*, 4, 540-547, 1899.

giving medical instruction to the 5,000 inhabitants of Boston, some years before the days of the first newspaper (1690).

Although THACHER's method of broadside propaganda was not used, some attempt was made to care for the common illnesses. Another preacher was GILES FIRMIN (1614-1697), a graduate of Emmanuel College, Cambridge, England, who came to Massachusetts in 1632 and was deacon of the first church in Boston. He later went to Ipswich, where he practised medicine among a colony of three or four hundred people. Probably he was the first anatomical lecturer in this country, giving instruction in a crude manner by informal talks about dried bones (7). He seems to have stimulated an interest, in the subject, moreover, for the General Court, in 1647, recommended that anatomical demonstrations be held at least once in four years. As in the case of THACHER's " Brief Rule," however, no one appears to have taken up the work of FIRMIN and anatomy remained practically untaught until well into the next century.

During the same period one notices the beginnings of a characteristic development in medicine in the founding of long lines of family physicians, instruction being carried on through generation after generation. Such is the line of the JOHN CLARKS, the first of whom came to America in 1638. Seven direct descendants, each with the same name covered the whole period of colonial medicine and the American Revolution. The last died in 1805. The history of this family illustrates the way medical education was usually carried on in the seventeenth and eighteenth centuries in New England. Son was taught by father, and not only was knowledge propagated in this way but the surgical instruments and the library of the physician were also handed down. With so successful a system in vogue, there must have seemed to the physicians of the earlier period to be little need for a medical school.

When we turn to the educators, particularly the early presidents of Harvard College, we note that LEONARD HOAR (1630?-1675) was a graduate in medicine of Cambridge, England (1671). CHAUNCY, his predecessor, was partly trained in medicine.

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(7) HOLMES, OLIVER WENDELL. Medical Essays. Boston, 1883; (" Scholastic and Bedside Teaching," pp. 278-283).

His six sons, all of whom were educated at Harvard College, became either preachers or physicians. JOHN ROGERS (1630-1684), a later president, was also a practitioner of medicine and a number of the early graduates, some of whom went abroad for their medical education, were counted as skillful physicians. Of the first class graduating from Harvard College, in 1642, two studied medicine in Europe. This custom, however, did not continue long except for rare exceptions; most of the men remained at home and were taught by the apprenticeship method. Of the twenty-six graduates of Harvard College before 1700 who practised medicine in New England, only two are known to have received the M.D. degree.

The diseases which prevailed in the seventeenth century in the colonies and which the governors, the clerical physicians and the few men actually trained in medicine had to combat, were, on the whole, from our point of view today, indefinite in diagnosis and unsatisfactory to treat. We hear largely of "fevers," mostly epidemic in character, colds, coughs, and agues, fluxes and vomits. Mental diseases seem to have been rare, although occasional accounts are found of hysteria. It is interesting to note that there was no physician connected with the witchcraft episode in Salem in 1691. In order to prevent the entrance of plague and smallpox into Boston, both of which were very rife in England during the seventeenth century, early measures were taken to guard the ports of Boston and Salem. Distinct epidemics of plague occurred in London in 1625, 1629 and 1665 and smallpox was prevalent in North America during practically the entire period from 1628 to 1685. Quarantine was established in Boston as early as 1648 and acts were passed against the pollution of Boston harbor. When the great epidemic of plague occurred in London in 1664 and 1665, all vessels coming from England were placed in quarantine and a quarantine station was established on one of the islands in Boston harbor to meet the special emergency of that time. Yellow fever made its appearance in Boston in 1693, having been brought from the Barbados. These quarantine measures were only reasonably effective, for none of them were permanent during this period and a single case of plague was likely to be the focus for an epidemic.

Thus we reach the end of a comparatively sterile period in

American medicine. What little was learned by the people was due to the keenmindedness of ministers like THACHER, who not only saw the value of SYDENHAM's great efforts in England but arranged for the spreading of his doctrines in America. SYDENHAM's later work was soon to exert a wider influence, for when we turn to the eighteenth century we find the best features of English medicine being quickly adopted by the American colonists; outstanding men appeared, quarantine measures were made permanent and other striking public health endeavors were put in force as the result of acts of the Legislature. A medical society was formed, sporadic literature appeared, and a new era became established with the first inoculations for smallpox in 1721, one hundred years after FULLER and the Plymouth Colony. Had any outstanding physician come from Europe during the first hundred year period, medicine might have advanced more rapidly, but no one came and the colonists were forced to do the best they could under the circumstances. Many intellectual people took part in the process and it is greatly to the credit of the educators and ministers that they saw the importance of the medical instruction of their people and when no one else was at hand to give it, they attempted to do so. Crude as this method of practice was, especially when mixed with a certain amount of religious bigotry, it at least missed some of the worst elements of medicine in Europe. No doubt the natural dependability of these pioneer colonists served well the people who needed their commonsense measures.

THE EIGHTEENTH CENTURY

With the turn of the century along with the continuation of the best from the previous hundred years we find a number of other distinct features added to American medicine. Epidemics of smallpox and plague with rare attacks of yellow fever were still the prime menace of the time. It was soon seen that a hospital was needed and as early as 1716 one was established for quarantine purposes on Spectacle Island in Boston harbor. With quarantine measures more strictly enforced we hear little of plague or yellow fever after 1720. The outstanding

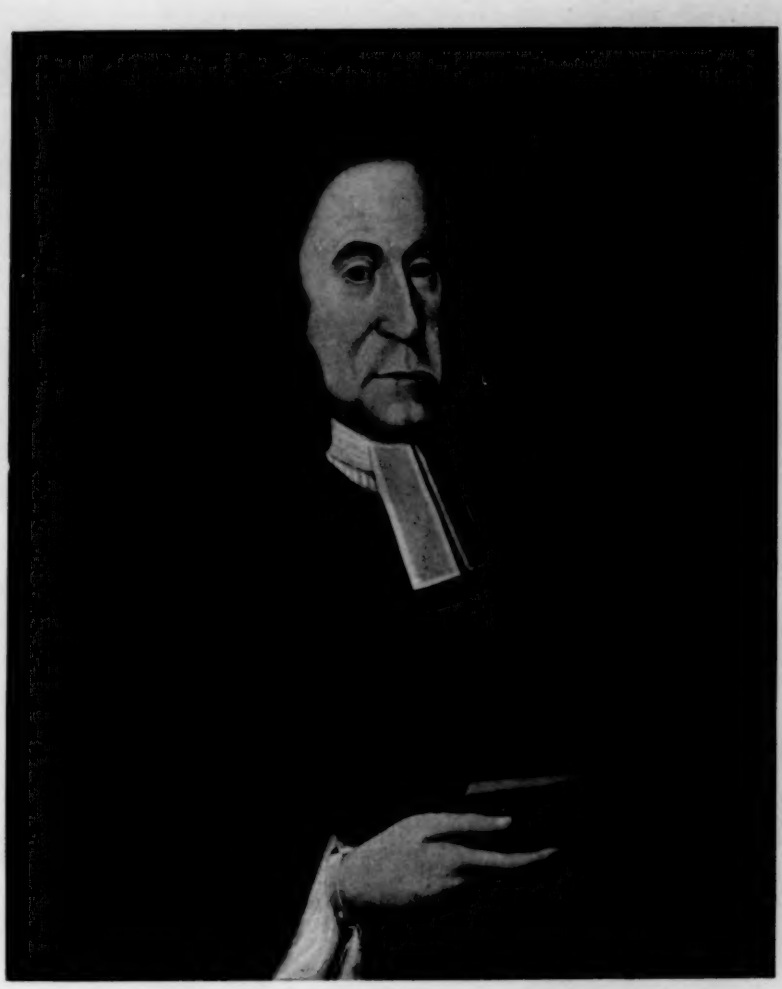

Fig. 1. Traditional portrait of THOMAS THACHER (1620-1678)
(Courtesy of the Old South Meeting House, Boston)

disease of the period was smallpox, which was ever present, terrifying in its destructiveness. The whole century was rife with it and it was not until 1800, long after the American Revolution, before the disease was overcome by Jennerian vaccination. Various attempts were made, however, to control the disease before this time. An act was established as early as 1701, authorizing the impressment of houses for isolation of patients. This act, however, was not effective, for smallpox raged the next year and continued sporadically until the great epidemic of 1721.

ZABDIEL BOYLSTON (1679-1766) began his first inoculations in the same year. The son of a physician, taught by his father and without a medical degree, he became the most meritorious physician of his day in America. He had attracted no special attention until the year 1721, when, at the age of forty-two, he was living in Dock Square, Boston, not far from the residence of Rev. BENJAMIN COLEMAN, pastor of the Brattle Street Church. Here he practised surgery as well as medicine and dispensed his own drugs at the time when smallpox invaded the city in epidemic character. The population of Boston was a little over ten thousand; during 1721 nearly six thousand persons had smallpox, with the death rate about one in seven (8). The only other outstanding practitioner of the time was WILLIAM DOUGLASS (1691-1752), a Scotchman thirty years of age, who had been in Boston a few years, having brought letters of recommendation to the three most important ministers of the day, INCREASE MATHER, his son COTTON, and BENJAMIN COLEMAN. He was well educated, having been at Edinburgh, Paris and Leyden, and was the only physician in the town who had received an M.D. degree. Well read, a versatile writer, a man of intelligence and ability, Douglass was, nevertheless, conceited, injudicious, inaccurate and contentious. He and BOYLSTON were to be opposed in a bitter battle, inaugurated, strangely enough, by COTTON MATHER, the learned but dissentious minister.

As early as 1716 MATHER wrote to Dr. JOHN WOODWARD of

(8) For a history of the epidemic, *see :* GEORGE LYMAN KITTREDGE's *Introduction to* "Several Reasons, etc." by INCREASE MATHER and "Sentiments on the Small Pox Inoculated" by COTTON MATHER. Cleveland : Printed for Private Distribution, 1921; *also,* KITTREDGE, GEORGE LYMAN. Some lost works of COTTON MATHER. *Proc. Mass. Hist. Soc.*, 45, 418-279, 1912.

Some ACCOUNT
Of what is ſaid of
Inoculating or Tranſplanting
THE

Small Pox.

By the Learned
Dr. *Emanuel Timonius,*
AND
Jacobus Pylarinus.
With ſome Remarks thereon.

To which are added,
A Few *Queries* in Anſwer to the *Scruples* of many about the *Lawfulneſs of this Method.*

Publiſhed
By Dr. ZABDIEL BOYLSTON.

BOSTON: Sold by S. GERRISH, at his Shop in Corn-Hill. 1721.

Fig. 3. The first pamphlet by ZABDIEL BOYLSTON (written for the most part by COTTON MATHER) on small pox inoculation. Boston: August or September, 1721. In another form of the title-page BOYLSTON's name is spelled BOYLSTONE. (Courtesy of the Massachusetts Historical Society.)

An Hiſtorical

ACCOUNT
OF THE
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INOCULATED
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Humbly dedicated to her Royal Highneſs the Princeſs of WALES, by *Zabdiel Boylſton*, Phyſician.

LONDON:
Printed for S. CHANDLER, *at the* Croſs-Keys *in the* Poultry.
M.DCC.XXVI.

Fig. 4. First edition of ZABDIEL BOYLSTON's *Small-pox Inoculated in New England*. London, 1726. (Courtesy of the Boston Public Library).

spelled BOYLSTONE.
(Courtesy of the Massachusetts Historical Society.)

A BRIEF RULE

To guide the Common-People of

NEW-ENGLAND

How to order themselves and theirs in the

Small Pocks, or Measels.

THe *small Pox* (whose nature and cure the *Measels* follow) is a disease in the blood, endeavouring to recover a new form and state.

2. This nature attempts---1. By Separation of the impure from the pure, thrusting it out from the Veins to the Flesh.---2. By driving out the impure from the Flesh to the Skin.

3 The first Separation is done in the first four dayes by a Feaverish boyling (Ebullition) of the Blood, laying down the impurities in the Fleshy parts which kindly effected the Feaverish tumult is calmed.

4. The second Separation from the Flesh to the Skin, or *Superficies* is done through the rest of the time of the disease.

5 There are several Errors in ordering these sick ones in both these Operations of Nature which prove very dangerous and commonly deadly either by overmuch hastening Nature beyond its own pace, or its hindering of it from its own vigorous operation.

6 The Separation by Ebullition in the Feaverish heat is over heightned by too much Clothes, too hot a room hot *Cordials*, as *Diascordium*, *Galenos powder* and such like, for hence come *Phrensies*, dangerous excessive sweats, or the flowing of the Pocks into one overspreading sore, vulgarly called the Flox.

7. The same seperation is overmuch hindred by preposterous cooling that Feaverish boyling heat, by *bloodletting*, *Glysters*, *Vomits*, *purges*, or *cooling medicines*. For though these many times hasten the coming forth of the *Pox*, yet they take away that supply which should keep them out till they are ripe, wherefore they sink in again to the deadly danger of the sick.

8. If a *Phrensie* happen, or through a *Plenitude* (that is fulness of blood) the Circulation of the blood be hindred, and thereupon the whole mass of blood choaked up, then either let blood, Or see that their diet, or medicines be not altogether cooling, but let them in no wise be heating, therefore let him lye no otherwise covered in his bed then he was wont in health: His Chamber not made hot with fire if the weather be temperate, let him drink small Beer only warm'd with a Toft let him sup up thin *water-gruel*, or *water pottage* made only of Indian Flour and water, instead of *Oat-meal*: Let him eat *boild Apples*: But I would not advise at this time any medicine besides. By this means that excessive *Ebullition* (or boyling of his blood) will by degrees abate, and the Symptoms cease; If not, but the blood be so enraged that it will admit no delay, then either let blood (if Age will bear it) or else give some notably cooling medicine, or refresh him with more free Air.

9 But if the boiling of the blood be weak and dull that there is cause to fear it is not able to work a Separation as it's wont to be in such as have been let blood, or are fat, or Flegmatick or brought low by some other sickness or labour of the (*Guaiacum*) running of the Reins, or some other Evacuation: In such Cases, *Cordials* must drive them out, or they must dy

10. In time of driving out the *Pocks* from the Flesh, here care must be had that the *Pustules* keep out in a right measure till they have attain'd their end without going in again, for that is deadly.

11. In this time take heed when the *Pustules* appear whilst not yet ripe, least by too much heat these arise a new *Ebullition* (or Feaverish boyling) for this troubles the driving out, or brings back the separated parts into the blood, or the fleshy parts over heated are disabled from a right suppuration or lastly the temper of the blood and tone of the Flesh is so perverted that it cannot overcome and digest the matter driven out

12. Yet on the other hand the breaking out must not be hindred, by exposing the sick unto the cold. The degree of heat must be such as is natural agrees with the temper of the fleshy parts: That which exceeds or falls short is dangerous: Therefore the season of the year, Age of the sick, and their manner of life here require a different and different Consideration requiring the Counsel of an expert Physician.

13. But if by any error a new *Ebullition* arise, the same art must be fled to allay it as is before expresst.

14. If the *Pustules* go in and a flux of the belly follows (for else there is no such danger) then *Cordials* are to be used, yet moderate and not too often for fear of new *Ebullition*.

15. If much spitting (*Pituita*) follow you may hope all will go well, therefore by no means hinder it: Only with warm small Beer let their mouths be washed.

16. When the *Pustules* are dryed and fallen purge well, especially if it be in *Autumne*.

17 As soon as this disease therefore appears by its form, let the sick abstain from Flesh and Wine, and open Air, let him use small Beer warmed with a Toft for his ordinary drink, and moderately when he desires it For food use *water-gruel*, *water-pottage*, and other things having no manifest hot quality, easy of digestion boild Apples, and milk sometimes for change, but the coldness taken off. Let the use of his bed be according to the season of the year, and the multitude of the *Pocks*, or as found persons are wont. In Summer let him rise according to custome, yet so as to be defended both from heat and cold in Excess, the disease will be the sooner over and less troublesome, for being kept in bed nourisheth the Feaverish heat and makes the *Pocks* break out with a painful inflamation

18. In a colder season and breaking forth of a multitude of *Pustules*, forcing the sick to keep his bed. let him be covered according to his custome in health a moderate fire in the winter being kindled in his Chamber, morning and Evening: neither need he keep his Arms alwayes in bed, or ly still in the same place, for fear least he should sweat which is very dangerous especially to youth.

20 Before the fourth day use no medicines to drive out, nor be too strict with the sick; for by how much the more gently the *Pustules* do grow, by so much the fuller and perfecter will the Separation be.

21. On the fourth day a gentle *Cordial* may help once given.

22. From that time a small draught of warm milk (not hot) a little dy'd with *Saffron* may be given morning and evening till the *Pustules* are come to their due greatness and ripeness

23 When the *Pustules* begin to dry and crust, least the rotten vapours strike inward, which sometimes causeth sudden death; Take morning and evening some temperate *Cordial* as four or five spoonfuls of *Malago wine* tinged with a little *Saffron*.

24. When the *Pustules* are dryd and fallen off, purge once and again, especially in the *Autumne Parts*

25. Beware of anointing with *Oils*, *Fatts*, *Ointments*, and such defensives, for keeping the corrupted matter in the *Pustules* from drying up, by the moisture they fret deeper into the Flesh, and so make the more deep Scarrs.

26. The young and lively men that are brought to a plentiful sweat in this sickness, about the eighth day the sweat stops of it self, by no means afterwards to be drawn out again, the sick thereupon feels most troublesome distress and anguish, and then makes abundance of water and so dyes.

Few young men and strong thus handled escape, except they fall into abundance of spitting or plentiful bleeding at the nose.

27 Signs discovering the Assault at first are heating pain in the head Forehead and temples, pain in the back, great sleepiness, glistring of the eyes, shining glimmerings seem before them itching of them also with tears flowing of themselves, itching of the Nose, short breath, dry Cough, soft snoring, hoarseness, heat redness, and sense of pricking over the whole body, terrors in the sleep sorrow and restlessness, beating of the heart, Urine sometimes as in health, sometime filthy from great *Ebullition*, and all this or many of these with a Feaverish distemper.

28. Signs warning of the probable Event. If they break forth easily, quickly, and soon come to ripening, if the Symptomes be gentle, the Feaver mild, and after the breaking forth in that 5 if the voice be free, and breathing easie, especially if the Pox be red white distinct, few, round, sharp top'd only without and not in the inward parts, if there be large bleeding at the nose. These signs are hopeful

29. But such signs are doubtful, when they difficultly appear, when they sink in again when they are black, blewish, green, hard, all in one, if the Feaver abate not with their breaking forth if there be Swooning, difficulty of breathing, great thirst, quesiness, great unquietness, and it is very dangerous, if there be joyn'd with it some other malignant Feaver, called by some the pestilential Pox: the *Spotted Feaver* is oft joyned with it

30 Deadly Signs if the *Flow of the Belly* happen, when they are broke forth, if the Urine be bloody or black, or the *Ordure* of that Colour, Or if pure blood be cast out by the Belly or Gumms: These Signs are for the most part deadly.

These things have I written Candid Reader, *not to inform the Learned Physician that hath much more cause to wonder and wher persons to the disease than I, but to give some light to those that have not such advantages, knowing the difficulty of this disease to the Physicians Art, sometimes, and dangerousness for the right managing of them in the whole Course of the disease tends both to the Patients safety, and the Physicians desired Success in his Administrations: For in vain is the Physicians Art employed, if they are not under a Regular Regimen. I am, though no Physician, yet a well wisher to the sick. And therefore witnessing the Lord to turn our hearts, and stay his hand, I am*

A Friend, Reader to thy Welfare,

22. 11. 167⅞. *Thomas Thacher.*

BOSTON, Printed and sold by *John Foster*. 1677

Fig. 2. THOMAS THACHER'S "Brief Rule". The first medical paper to be publishe in America. Boston : 1677.
(Courtesy of the Massachusetts Historical Society)

Isis XXIII, pl. 4.

H. R. VIETS.

AN

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The Second Edition, Corrected.

LONDON:

Printed for S. CHANDLER, at the Croſs-Keys in the Poultry. M. DCC. XXVI.

Re-Printed at *BOSTON* in *N. E.* for S. GERRISH in *Cornhil*, and T. HANCOCK at the Bible and Three Crowns in *Annſtreet*. M. DCC. XXX.

Fig. 5. Second edition of ZABDIEL BOYLSTON's *Small-pox Inoculated in New-England*. Boston : 1730. (Courtesy of the Boston Medical Library.)

THE

Practical HISTORY

OF

A New Epidemical Eruptive Miliary Fever, with an Angina Ulcuſculoſa

Which

Prevailed in *Boſton* New-England in the Years 1735 and 1736.

By *William Douglaſs*, M. D.

BOSTON, N. E.

Printed and ſold by *Thomas Fleet*, at the Sign of the *Heart* and *Crown* in Cornhill. 1736.

Fig. 6. First edition of DOUGLASS'book on scarlet fever. Boston : 1736. (Courtesy of the Surgeon General's Library, Washington.)

London, having seen the paper by TIMONIUS of Constantinople in No. 339 of the *Philosophical Transactions of the Royal Society* (April-June 1714) on direct inoculation of smallpox virus into healthy people as a protection against the disease, and having known " many months before " of the practice from his negro servant, ONESIMUS, who had been inoculated in Africa. Thus, five years before the epidemic of 1721, MATHER had planned to suggest the use of this method when occasion should arise. When smallpox appeared in Boston in April 1721, therefore, MATHER, with his usual lack of tact, exhorted the ten physicians then in practice to inoculate by the Turkish method (June 6), advice which was not very kindly received by DOUGLASS and certain other doctors. He, therefore, turned to BOYLSTON (June 24), who having no degree and without even the prestige of the younger DOUGLASS was the least considerable of the practitioners. BOYLSTON, however, immediately decided to act upon MATHER's suggestion and undertook experiments with inoculation two days later (June 26), inoculating his son, aged six, and two of his negro slaves. A controversy was at once started. BOYLSTON's life and that of each of his family were hardly safe. Mather was not popular and BOYLSTON had to stand the brunt of the attack made by his brother physicians. Many pious and sober people, moreover, thought that if any of BOYLSTON's patients should die, he ought to be treated as a murderer. It is even reported that parties with halters threatened to hang him to the nearest tree and he was obliged to remain secreted for a period of two weeks. MATHER wrote in his diary (July 16) that the people " rave, rail, they blaspheme; they talk not only like Ideots but also like *Franticks*, And not only the Physician who began the Experiment, but I also am an Object of their Fury; their furious Obloquies and Invectives " (9). A " war of pamphlets " ensued, written by the MATHERS, BOYLSTON, DOUGLASS and others. The authorities were on the side of the people and the selectmen adopting their views, forbade further inoculations. BOYLSTON, sure of his ground, persisted, in contempt of the magistrates and in contradiction to the practitioners. He does not seem to have had any of the

(9) MATHER, COTTON. Diary of COTTON MATHER, 1709-1724. *Collections Mass. Hist. Soc. S.* 7, 8, 632, 1922.

physicians of the time on his side; certainly DOUGLASS was in violent opposition. By both writing and speech DOUGLASS made every effort to counteract his work. By the end of the summer of 1721, however, BOYLSTON and MATHER were gaining ground and they prepared a paper in their own defence, published in August or September. Some ministers underwent inoculation and advised their parishioners to do so. As the epidemic increased in severity, so did the number of those inoculated. The better educated and more intelligent were in favor of the method and by October, of the more than three score persons who had been inoculated, only one of them had died, apparently of some other disease. When smallpox appeared in Cambridge, BOYLSTON inoculated a number of students and some of the instructors of Harvard College and by the spring of 1722 there was a record of two hundred and eighty inoculations with only six deaths. The epidemic gradually came to an end and BOYLSTON finally received full recognition.

The work of BOYLSTON was followed closely in England. BOYLSTON went to London in 1724 to report his experiences, for he had inoculated more persons than any English surgeon. He lectured before the Royal College of Physicians and the Royal Society, being elected a member of the latter group in 1726. His book, " An Historical Account of the Small-Pox Inoculated in New England, etc.", was published in the same year, in London, and in 1730 in Boston. It is a most accurate account and a careful record of every minute detail of his procedures, logically set forth and clearly tabulated. This masterly clinical presentation was the first of its kind from an American physician.

When BOYLSTON returned to Boston in 1726, opposition had largely died down and even DOUGLASS, his principal rival, later became an earnest advocate of the practice. In 1752, when the next epidemic occurred, about one person in three in a population of fifteen thousand was affected. Two thousand people were inoculated by the BOYLSTON method, with a mortality of one in sixty-eight, compared to the mortality of one to ten or eleven in those not inoculated. The method, a crude one, usually gave the individual a mild attack of smallpox but sufficed to cause an immunity in a large number of people and thus protect them against future epidemics. The death rate from inoculation was relatively small, but protection was not by any means certain.

Direct inoculation, however, served a useful purpose, although, of course, it was completely supplanted by cowpox vaccination after 1800.

In the meantime the brilliant physician, WILLIAM DOUGLASS (10), continued as a practitioner and as a writer of books and pamphlets. His interests were very wide and he receives credit for many striking inovations. He was the first to organize (1735) a medical society, and this lasted about ten years. He even proposed the publication of " Memoirs " and drew up the prospectus for the initial number, which, unfortunately, was never printed. It was through this Society that we learn for the first time of a surgeon, SILVESTER GARDINER (11), who operated for bladder calculus in 1741 before the members of the " Medical Society of Boston ". The year after the founding of the medical society, in 1735, DOUGLASS observed an epidemic of scarlet fever which began in Kingston and gradually spread into Boston. The death rate was about one in thirty-five and DOUGLASS reports that there were nearly four thousand cases. He kept very full notes and described the disease in all its details, publishing his book the next year. This accurate clinical observation reveals DOUGLASS as an unusually acute observer and great credit is due him for his splendid delineation of the disease. In addition to DOUGLASS' work on scarlet fever we must note that he had many scientific interests outside of medicine. He had a large correspondence with CADWALLADER COLDEN (1688-1776) of New York in regard to such subjects as eclipses, earthquakes, and maps. He traveled throughout the four colonies of Massachusetts Bay and commenced a map of New England based on actual surveys, but left unfinished at the time of his death. He was also interested in botany and made a collection of over a thousand American plants, published an almanac and a number of papers on economics, especially one on the currencies used at the time, said to be the very best of the eighteenth century descriptions of money questions. Aside from medicine, DOUGLASS should be noted as a philanthropist giving a sum of money for the town of DOUGLASS, Massachusetts, as the president of the Scotch Charitable Society from 1728

(10) WEAVER, GEORGE H. The life and writings of WILLIAM DOUGLASS, M.D., 1691-1752. *Bull. Soc. Med. Hist.*, Chicago, 2, 229-259, 1921.

(11) *See:* Dict. Amer. Biog. vol. 7, 1931.

until his death, and as the author of a two-volume work published in 1749 and 1751 on the history of the Massachusetts Bay Colony. DOUGLASS was a man of strong prejudices, always inclined to take one side of any question and incapable of seeing any other, and his book shows evidence of his onesidedness. The history, however, is of considerable value in spite of its well marked deficiencies.

DOUGLASS conforms, therefore, more definitely to the standard set by the great Scotch and English physicians, with very wide spread interests in medicine, natural history and economics. He was probably too learned and certainly too controversial ever to be a skillful practitioner. One is surprised at his opposition to BOYLSTON's inoculation experiments, but it was probably more opposition to the man than to the experiments, as DOUGLASS must have seen the value of inoculation from his fine scientific training. He could not, however, uphold the relatively uneducated BOYLSTON, who had never received a degree in medicine.

Of SILVESTER GARDINER (1708-1786), the third outstanding physician before the American Revolution, we know little. He was trained in London, particularly by WILLIAM CHESELDEN (1688-1752), and later studied in Paris. Returning to Boston in 1735, he developed an extensive practice, was one of the early members of DOUGLASS' "Medical Society in Boston," established the first apothecary shop in 1744, taught students (12), and, as already noted, successfully removed a stone from the bladder in 1741. He built a large house and entertained lavishly, being one of the important personalities of his time. It was not unnatural that he became an ardent loyalist and retired to Halifax at the time of the evacuation of Boston. He and DOUGLASS were, therefore, the first physicians to be adequately educated in England and then to practise in America, and they both exerted a marked influence on American medicine. They were to be followed shortly by JAMES LLOYD, who did even more to anglicize medicine in New England.

JAMES LLOYD (1728-1810) lived throughout the eighteenth century and into the first decade of the next. He, like GARDINER,

(12) ANDERSON, PERSIS G. JOHN DENISON HARTSHORN. *Bull. Med. Lib. Asso., N.S.* 18, 19-22, 1929; (abstracts from an unpublished diary (1752-1756) in the Boston Medical Library. HARTSHORN was apprenticed to SILVESTER GARDINER).

studied in England under CHESELDEN, acted as a dresser at Guy's Hospital, attended the lectures on midwifery by WILLIAM SMELLIE (1697-1763) and those of WILLIAM and JOHN HUNTER. The latter, exactly LLOYD's age, had been in London only two years. LLOYD was immediately attracted to him and they kept up a correspondence until HUNTER died in 1793. It was through this preliminary training and constant contact with English physicians that LLOYD was able to stamp upon Boston medicine his striking personality with its English characteristics. Returning to Boston in 1752, the year that DOUGLASS died, he found GARDINER his only rival, for BOYLSTON retired from practice about the same time. The "Medical Society in Boston" had died out ten years before. GARDINER's apothecary shop was the important drugstore in Boston. Two members of the CLARK family were in practice, but neither proved to be a rival of the energetic LLOYD, who began to practice obstetrics almost at once, the first physician in this country to do midwifery upon a scientific basis (13). His practice grew rapidly and he assumed the position as leading physician of Boston, medically as well as socially, formerly occupied by DOUGLASS. His house was noted for its hospitality; he had a splendid garden, was fond of sports and numbered among his friends, as well as patients, General HOWE and Lord PERCY. It was LLOYD who began to take students into his house on a scale never before attempted by any previous physician in Boston. Many of his pupils became later well known physicians, the most important being JOSEPH WARREN (1741-1775). He, although killed at Bunker Hill, strongly influenced his younger brother, JOHN WARREN (1753-1815). Other students of LLOYD were ISAAC RAND, JOHN JEFFRIES, THEODORE PARSONS and the sixth JOHN CLARK. All these young men were graduates of Harvard College. LLOYD left no writing and was more socially than scientifically inclined. He is not, in one sense of the word, to be compared with BOYLSTON or WILLIAM DOUGLASS. On the other hand, he was a teacher whose influence was widely felt, a practitioner of eminence, the first obstetrician in this country, and a man of sound practice.

(13) THOMS, HERBERT. Chapters in American Obstetrics. Springfield, Ill., 1933.

It is these four men upon whom we can look back, from 1700 to 1775, as the molders of American medicine in Massachusetts before the Revolution. The outstanding man of the time, from our modern point of view, was undoubtedly ZABDIEL BOYLSTON with his work on smallpox prevention (1721). DOUGLASS, too, had many accomplishments to his credit, particularly his accurate description of scarlet fever, in 1736, and his attempt to form the first medical society. GARDINER, a skillful physician, though primarily a man of business, established the first apothecary shop, in 1744. LLOYD, as we have seen, was the first obstetrician in this country and an educator, who instilled into the young men of the time the spirit of CHESELDEN and the brothers HUNTER. The period closes with LLOYD and GARDINER as the outstanding men, but with a host of young men coming to the front who were soon to divide into the loyalist camp, on the one side, and the patriots, on the other.

Boston, Mass. HENRY R. VIETS.

The Chemical Industries of the American Aborigines

Many American chemical industries of the present had their beginning among the aboriginal races who previous to the arrival of the Europeans were scattered over the land areas of the Western Hemisphere from Alaska and Greenland in the North to Tierra del Fuego in the South. While the continents of North and South America were perhaps originally peopled by the passage of tribes in prehistoric times from Asia, either by overland migration or by navigation from island to island across the Pacific, these emigrations were at such a remote time that no vestiges of the arts and crafts which these Asiatic wanderers may have brought with them have survived. The types of native culture observed by the first European settlers were as purely indigenous as chocolate, caoutchouc, jalap, cochineal, copal and the numerous other products whose properties and uses were learned by the colonists from the original inhabitants. The modern names of many of these commodities are indicative of the tribe which made them known. The technological pursuits of the American aborigines are, therefore, deserving of study both because of their influence upon the arts of the European colonists and for the light which they throw upon the origin of industries in general.

The American Fertilizer Industry, which in the value of its products ranks as one of the most important of chemical manufactures, owes its inception to aboriginal enterprise. Many of the Indians understood the advantage of fertilizing the soil with fish, shells and wood-ashes. The tribes along the sandy Atlantic coast, where the soil was poor and sea-food plentiful, were quick to note the advantage derived from manuring their patches of maize with fish and this bit of practical information, learned from the Indians, saved the early settlers from famine.

Of the herring, alewives and other fish, which the Indians used for manure, the most abundant was the menhaden, of which the name (a corruption of the Narragansett word *munnawhat* meaning fertilizer) is a reminder of the use to which in early days this fish was put. Among other substances used by the American aborigines for manuring should be mentioned guano (from the Quichua word *huanu*, meaning dung). The use of this material, now one of the most important of modern fertilizers, was taught to the Spaniards by the native Peruvians, who realized the agricultural benefits of bird manure to such an extent that the rights for gathering it were most carefully protected and the killing of sea fowl made a capital offense.

The early European colonists were indebted to the native Indians for numerous articles of food. Hominy, succotash, samp, sagamité, pone, pemmican and other words of Indian origin are reminders of this ancient obligation. The preparation of many of these foods involved a rudimentary knowledge of certain chemical operations.

The accidental wetting of vegetable food among the alkaline ashes of his fireplace was possibly what led the Indian to discover the softening effect of lye upon plant tissues. The hulling of maize by steeping in a decoction of wood ashes was practised by nearly all the American tribes, an operation which was imitated by the colonists in the manufacture of lye hominy. In making the food called *sofki* the grain was crushed in a mortar and then cooked with water which had percolated through wood ashes. The boiling alkali softened the meal and turned it a deep yellow.

For sweetening their foods the American aborigines employed in addition to honey the concentrated juice of maize stalks and the evaporated sap of the maple. At a certain period of maturity the lower portion of the maize stalk upon squeezing liberates a juice that in agreeableness of flavor almost equals that of the sugar cane, to which plant the maize, in fact, is a close botanical relation. In the tropical zone, where the period of growth is longer, the stalks of certain varieties of maize may at times approach the sugar cane in sweetness and it was naturally in this region that the utilization of maize for sweetening purposes was most advanced. The Aztecs concentrated maize juice to a sugary mass, which they used in preparing chocolate and con-

fections. CORTES in writing to CHARLES V made the following statement regarding the sweetening products sold in the public markets of Mexico:

"They sell bees-honey and wax, and honey made of cornstalks, which is as sweet and syrup-like as that of sugar, also honey of a plant called maguey, which is better than most; from these same plants they make sugar and wine, which they also sell."

The sweetening quality of the maize was known also to the more northerly Indian tribes and the knowledge was imparted by them to the European colonists, who employed the sirup and molasses of cornstalks for sweetening and fermenting when sugar-cane products were lacking. In a paper by JOHN WINTHROP, Jr., the first Colonial Governor of Connecticut, upon the "Description, Culture and Use of Maize," read before the Royal Society in 1663, attention is called to the possibility of making sirup and sugar from cornstalks.

But the greatest contribution of the American aborigines to the list of the world's sweetening materials is maple sugar. While some authorities hold that the Indians produced no maple sirup or sugar until after the arrival of European colonists, it is now generally agreed by leading ethnologists that the art was practised by the natives of America long before this period.

The testimony of JOUTEL, LAFITEAU, BOSSU and other early writers as well as that of tribal legends all agree in ascribing the origin of maple sugar to the Indians. While American aborigines lacked the metal kettles that were used by the European colonists for concentrating the sap, they had at their disposal utensils of steatite and pottery which were very generally employed for the boiling of liquid food. The Indians used evaporating dishes of pottery for making salt and in all likelihood employed them also for concentrating the sap of the maple. Evaporation might also have been accomplished by the primitive method of dropping hot stones into the sap in containers of hide or wood, or in water-tight baskets of bark, the stones being removed as they cooled for reheating. In some cases after the hot stones had brought the liquid to the boiling point the Indians continued the heating by suspending the bark container at a slight distance above a bed of glowing coals.

In the preparation of their food the American aborigines

employed several methods for removing objectionable constituents. The Hupa Indians of California extracted the bitter tannin substances of acorns by grinding the dried kernels and leaching the meal with water. The most widely practised method of this kind was the process which the Indians of the tropics used in making tapioca or cassava meal. This substance, which is prepared from the root of the *manioc*, or cassava plant, has from time immemorial constituted one of the principal foods for man in the American equatorial regions. Owing, however, to the hydrolysis of a poisonous glucoside the manioc roots in their natural state contain from 0.02 to 0.03 percent of hydrocyanic acid which renders them dangerous for eating. The ancient aboriginal method of removing this harmful constituent consisted in first rubbing the decorticated roots upon graters made by driving numerous sharp pointed fragments of flint into slabs of wood. The grated pulp was then squeezed in a basket press in order to remove the poisonous juice. The starchy residue was then spread in a thin layer upon a heated griddle of stone or pottery where it was kept in frequent motion until dry. The cassava meal was thus completely deprived of its soluble volatile poison and could then be used as food. For preparing a finer quality of meal the grated pulp was washed with water through a fine sieve and allowed to settle in a basin. The sediment of starch was then freed from the excess of water by pressing or squeezing in a basket press and dried as previously described. Remains of cassava graters and griddles occur in abundance on the sites of ancient Indian villages in the tropics and show the wide extent of this primitive chemical industry among the American aborigines.

The Seminole Indians of Florida employed the starchy roots of a plant called *coonti*, *(Zamia integrifolia)* which were pounded up and used for manufacturing flour. The apparatus employed for this purpose consisted of mortars, pestles, strainers and settling vessels. The starchy matter after washing from the pounded roots was purified by settling and straining. The wet mass was then allowed to ferment slightly after which it was dried upon palmetto leaves and then baked into bread. Coonti flour found considerable demand among the early white settlers of the South and mills were established for its manufacture.

The greatest food luxury which the world owes to the American aborigines is chocolate. The preparation of this beverage from the seeds of the cacao fruit reached its highest point of development among the more highly advanced tribes of Mexico. The process which they employed consisted in first roasting the dried beans over a gentle fire, after which they were crushed in a mortar into small pieces and the shells removed. The clean fragments of the kernels were then ground, while still warm, into a paste by means of a stone roller upon a flat mortar or metate, with the addition of vanilla, spices and other flavoring substances. The paste was then moulded into tablets and allowed to harden. In preparing the beverage one or more of the tablets was beaten up in a cup of hot water by means of special stirrers or molinets with the addition of honey or maize sugar for sweetening. The modern chocolate manufacturer follows essentially the same steps of the process as they were first learned from the Indians.

Besides chocolate a large number of other beverages were employed by the American aborigines. Infusions of different barks, roots, leaves and fruits were widely used. The famous black drink, *yaupon* or " Carolina tea," employed by the Creeks and other Southern Indians, was made by gently roasting the leaves of the *Ilex vomitoria* in a pot and then boiling in water. Strong infusions of this drink act as an emetic and as this effect was the one first noticed by the whites in observing the ceremonial uses of the decoction by the Indians the other properties of the plant were overlooked. Weaker infusions, owing to the presence of caffeine, act much the same as tea and coffee. Leaves of the *Ilex vomitoria* were gathered by the Indians in considerable quantity and, after being dried, roasted and packed in baskets, formed an article of trade among the different tribes. " Carolina tea " was also drunk by the white settlers who learned its use from the Indians.

While fermented beverages were not generally drunk by the American aborigines, the phenomenon of alcoholic fermentation and the intoxicating effect of the liquor thus produced were known to a few tribes. Some of the California Indians made a wine from the manzanita by washing the berries and allowing the expressed juice to undergo a natural fermentation. The best known beverage of this type was the Mexican drink *octli*, called

pulque by the Spaniards, which consisted of the fermented juice of the maguey *(Agave americana)*. As this plant approached the flowering stage, the heart, or middle of the stem, was cut out so as to leave a cavity about two feet deep and eighteen inches wide. The sap, which ordinarily would have entered the flower stalk, flowed into this natural receptacle, whence it was transferred three or four times a day to vessels of pottery or skin where it underwent a rapid alcoholic fermentation. A little old pulque was usually added to the juice as a starter.

The preparation of alcoholic beverages from malt was also practised by the American aborigines. The drink called *tizwin* by the Apaches was made by burying corn until it sprouted. The malted grain was then dried, ground to a meal, stirred with water and allowed to ferment in a warm place. The mash was put in a jar that had been previously used for brewing, the pores of the vessel retaining the organisms necessary to start the fermentation.

The first chemical compound which attracted the attention of man in his progress from savagery to civilization was common salt. The physiological need for this substance, both among herbivorous animals and man, played an important part in the affairs of the Western Hemisphere long before the coming of the Europeans. The trails, made by buffalo and deer to salty springs and licks, were followed by the Indians in pursuit of game. At these same springs the native made his first experiments in concentrating the brine from which he knew salt must be deposited from his observing the incrustations upon sticks and stones. The removal of these natural crystalline deposits was the first step in the evolution of salt manufacture; artificial evaporation could come only after the invention of receptacles for concentrating the brine. The manufacture of salt at many of the licks, begun by the Indians, was continued by the first colonists.

Not all of the American Indians ate salt with their food. In fact most of the flesh-eating tribes, as the Eskimos, who do not have the same physiological need for salt, regarded its use as objectionable. The Virginia and other Indians used as a substitute for salt the saline ashes of certain plants, such as the saltwort. The majority of the Indians, however, used salt and

a considerable traffic in this commodity over long distances took place between some of the tribes. Remains of evaporating vessels of very thick pottery, which the aborigines used for concentrating brine, have been found at many salt springs. In some places where there were veins of mineral salt or where the crystals were deposited naturally from the saturated water, as at the Zuni Salt, Lake, artificial evaporation was not required.

In some cases where the natural product was contaminated with earth the Indians purified the salt by placing the material in funnel-shaped leaching baskets and allowing the water to percolate through. The leachings were then strained into pots and boiled down over a fire. This method of salt manufacture was observed among the Southern Indians by the Spaniards of De Soto's expedition. Fragments of Indian leaching baskets used for the manufacture of salt, have been found at Petite Cure Island, Louisiana, and elsewhere.

The manufacture of salt among the American aborigines reached its highest development among the Aztecs, whose kings made a monopoly of this product and refused to sell it except to tributary tribes. It was prepared by boiling down the water of salt lakes in pottery vessels and also by solar evaporation in shallow pools. The Aztecs used salt not only as a condiment but also for preserving meats. The latter purpose is another example of the superior advancement of the Mexican Indians.

The skins of animals constituted the first garments worn by uncivilized man and the dressing of hides became in consequence one of the earliest chemical industries. A number of processes were used among the American aborigines for dressing skins. In the Arctic regions hides were usually smoked to preserve them against decay and to render them impervious to water. In the more temperate regions of North America a process of brain tannage was employed. The skins, after scraping with a sharp piece of horn or stone to remove adhering flesh and hair, were thoroughly rubbed with a mixture of cooked brains, liver and grease, with the addition occasionally of pounded soap-root, salt and other substances. The hides were then soaked in water over night, after which they were wrung out and scraped with a flat stone to remove the excess of absorbed moisture. After drying and bleaching in the sun the skins were rubbed with

a rough piece of bone which gave them a uniform grain and texture. The hides were then drawn back and forth across a tree trunk in order to make the skin pliable. A final washing with clay water might then be given to improve the appearance. Brain tannage was adopted from the Indians by some of the early pioneers.

The action of the grease and of the phosphorized fat of the brains used in the Indian method of dressing skins is probably similar to the action of the oil used in preparing chamois leather. Instead of brains the Indians sometimes used a mixture of corn meal and eggs which was beaten into the skins with a wooden pestle. After being dressed according to the methods just described the skins were sometimes smoked as an additional protection. This was accomplished by stretching the hides over a pit in which was a smouldering fire of damp wood. The various barks used by the American Indians for dyeing skins had a certain tanning action. Tanning by means of bark infusions does not, however, appear to have been practised by the North American aborigines.

The adornment of his person with pigments and the coloration of his hides, textiles and other possessions with dyes was practised by nearly every aboriginal native of both North and South America. In addition to its decorative and ceremonial significance the painting of his skin with mixtures of grease and mineral pigments had another important purpose with the Indian in that it protected him against mosquitoes and other insects.

The inorganic colors which the Indians employed were obtained from a variety of minerals which were quarried and mined extensively in all parts of the continent. For white colors powdered limestone, gypsum and kaolin were used; for reds powdered hematite and red ochre; for yellows powdered sandstone, yellow ochre and clay; for greens and blues various ores of copper; for blacks powdered graphite, coal and charcoal. For pulverizing these pigments mortars, mullers and various stone grinding slabs were employed. After being ground to the necessary fineness the colors were applied by means of water, oil, grease and various decoctions of glue, gum and vegetable mucilage.

At the time of the first European explorations the American aborigines had acquired a vast knowledge of the coloring properties

of differents lichens, barks, roots, nuts, berries and other natural products. The use of many dye stuffs, such as *puccoon (Lithospermum vulgare)*, bloodroot *(Sanguinaria canadensis)*, golden seal *(Hydrastis canadensis)*, etc., were learned by the early colonists from the Indians. In addition to the dyes just named the Indians employed decoctions of bark form the butternut, walnut, beech, sumac, maple, etc., and the juice of pokeberries, blueberries, elderberries, cactus, yucca, wild indigo, and many other plants. The natural shades of yellow, brown, red, blue, green, etc., produced by these various dyes, were modified in many cases by treatment with urine or with the juice of the crab-apple and prickly pear. Among the more highly civilized tribes of Mexico and South America alum, salt-peter, and other naturally occurring salts, were employed for changing or fixing the various vegetable dyes.

According to H. H. BANCROFT the Mexicans at the time of the Spanish conquest probably excelled the Europeans in the variety and excellence of their deystuffs. The numerous dye-woods, such as log-wood, peach wood, Brazil-wood, fustic, etc. wich are still among the chief experts of the American tropics, were all employed by the aborigenes who taught the Europeans their properties and uses. In all probability many tinctorial secrets of these native craftsmen were never acquired.

The deystuff in which the Mexicans displayed the greatest mastery, to the wonder and admiration of their Spanish conquerors, was cochineal. This product consists of the dried bodies of a small scale-insect, the *Coccus cacti*, which feeds on certain cactus plants known under the general term of nopal. Special plantations of these cacti, kwnon as nopalries, were cultivated by the Indians for the propagation of the color-producing insects, which were reared with the greatest care and attention. The female insects, after laying sufficients eggs for a new brood, were brushed from the cactus leaves upon wooden plates and killed either by immersion in hot water, by heaping up in the sun, or by placing in an oven. The process of hot-water immersion gave a product of inferior value. The cochineal industry was of the greatest antiquity in Mexico, going back, as HUMBOLDT surmised, beyond the time of the Toltec invasion, or a thousand years before the Spanish conquest. The rearing of the insects is still

carried on, although the industry has greatly declined since the discovery of the synthetic azo-scarlet dyes.

Cochineal gives a great variety of tints according to the method of treatment. It produces directly a brilliant crimson, which is changed by acids to an orange and by alkalies to a violet. The processes employed by the ancient Mexican dyers in the use of cochineal are not known, but from their acquaintance with soda, potash, alum and other mineral salts and with the properties of different vegetable juices, it is reasonable to suppose that they understood perfectly the numerous changes of color which mordanting and other methods of treatment can produce (1).

The protection of painted surfaces by means of vegetable gums and other substances was also understood by the more highly civilized aborigines of America. The milky latex of various trees was used in some cases as a sort of varnish. The gathering of the latex for manufacturing rubber playing balls and for making waterproof bags, boots and garments was observed by the early Spanish and Portuguese explorers among the Indian tribes of tropical America, who were thus the founders of the modern rubber industry. The aboriginal methods of gathering the latex and curing it by means of smoke are still followed along the Amazon.

The manufacture of pottery, one of the oldest of the chemical arts, was practised by nearly all of the aborigines of North and South America. Vessels made of clay alone are apt to crack during firing and to prevent this the pottery-making Indians all tempered their clay with sand, ground shells, powdered stone, or the pulverized fragments of old potsherds. The baking was usually done in open fires and the pottery was consequently of a soft porous character. Among the Pueblo tribes where the art reached a higher level crude furnaces were used. In

(1) The beautiful fiery scarlets produced by the action of stannous and stannic chloride upon cochineal were not known, however, to the ancient Mexicans. This discovery was made accidentally by the Dutch chemist CORNELIUS DREBBEL in the early part of the seventeenth century and led to a new era in the use of cochineal. DREBBEL communicated the observation to his son-in-law, Dr. KUFFLER, a dyer of Leyden, who perfected the discovery, which became known in consequence as the color Kufflerianus. The secret of the new color was afterwards made known to the GOBELIN brothers of Paris, who won great celebrity for their beautiful scarlets.

Mexico, Central America and Peru, where the furnace reached its highest state of development, a much harder pottery was produced. Fragments of ancient ware uncovered in Central America show evidences of a true glaze. Remains of decorated pottery found on the ruined sites of cliff dwellings and deserted villages in New Mexico and Arizona show that a kind of salt glaze was used by the old tribes. Glazing was not possible, however, with the open method of firing generally practised by the North American Indians.

The pottery made by the American aborigines was decorated with various mineral and vegetable pigments which were usually applied with a brush. The decorated ware of the more civilized Mexican and Peruvian tribes was, however, of a higher order, approaching in some cases the nature of cloisonné. Specimens of such pottery seem to indicate that a body of plain baked ware was covered with a thick coating of clay which after drying was carved with the design down to the baked undersurface. The incised places were then filled in with pastes of white, red, yellow and other pigments and the whole fixed by means of a second firing in the furnace.

Baked clay was used by the ancient Mexicans for other purposes than brick and pottery. Remains of terra cotta water-pipes have been discovered, the various joints of which, fitting into one another, were made tight by means of cement.

While none of the American aborigines at the time of the discovery had completely emerged from the stone age, many of the tribes had acquired a proficiency in the use of certain metals. Ancient objects found in mounds, tombs and village sites of North and South America have been found to contain gold, silver, platinum, copper, tin, lead and iron. The presence of some of these elements in certain cases is, however, accidental, as with platinum, owing to the occurrence of various natural alloys from which the objects were made. With a few exceptions among the more civilized tribes of Mexico, Central and South America, who had acquired considerable skill in smelting, the relics mentioned above were all made from naturally occurring metals.

Iron, although its ores are the most abundant and widely distributed of any metal in the Western Hemisphere, was not

known to the American Indians except in the meteoric condition. Numerous implements and ornaments of meteoric iron have been found in the mounds of the Mississippi Valley, in some cases with the lumps of native metal from with the objects were made. The large meteoric masses brought by Admiral Peary from Greenland and deposited in the American Museum of Natural History in New York had been used for many generations by the Esquimaux as a source of iron for making knives and other implements.

The metal in most common use among the American aborigines was copper. Extensive mines and quarries of ancient origin about Lake Superior indicate that this region was a source of copper supply to the Indians over a large area. These rich veins of metal were eroded by moving ice in prehistoric times and the pieces of copper left among the glacial deposits to the south were also much sought after by the Indians. The nuggets of metal thus found were probably used at first very much in the manner employed with stones but with the discovery of its malleability and capacity of being worked and polished the hammering of copper into knives, bracelets and other ornaments became very general. Large plates of sheet copper with figures and designs in relief have been uncovered in mounds.

The most important aboriginal copper mines were in northern Michigan and on Isle Royale in Lake Superior. The methods of quarrying were simple, the surface layer of earth being removed and the pieces of metal detached either by hammering with stone sledges or by disintegrating the rock with fire. These aboriginal copper mines were afterwards developed by the whites.

Metallurgy among the American aborigines reached its highest development among the Mexicans and Peruvians, who for the manufacture of axes, chisels and other cutting tools employed copper that had been hardened with a little tin. HUMBOLDT brought home an ancient Peruvian chisel in which VAUQUELIN found 94 percent of copper and 6 percent of tin. The alloy was so well forged that it had the high specific gravity of 8.815. Copper thus tempered was sufficiently hard for working wood but for cutting stone the edge of the tool had to be assisted with sharp particles of sand. The Mexicans obtained their copper from the mountains of Zacotollan and their tin, lead and silver

from the mines of Tasco. "These were taken," according to PRESCOTT, "not only from the crude masses on the surface but from veins wrought in the solid rock, into which they opened extensive galleries." It is not probable that with the immense stores of native copper at their disposal, the American aborigines ever smelted this metal from its ores to any considerable extent. CUSHING (2), however, believes that roasting and smelting were done in primitive furnaces which he found in the Salt River valley.

Information upon the metallurgy of tin and lead among the American aborigines is lacking. Cortes, in his search for metals for casting cannon, found tin as a circulating medium in certain parts of Mexico and states that a mine of this metal was worked at Tasco. Galena occurs widely distributed in both North and South America and the shining crystals of this mineral were greatly prized by many Indian tribes. From the ease with which this ore is reduced by burning wood the accidental production of lead was no doubt a fairly common observation. The dull color and softness of this metal, however, were not properties that recommended it to uncivilized man either for ornament or general utility.

Although small aboriginal objects of gold and silver have been found in many parts of North and South America it was in ancient Mexico, Central America and Peru that the precious metals attained their widest use. The gold employed by the tribes of this region was gathered mostly from the beds of streams. In Peru the Indians built stone bars across the beds of mountain streams to construct riffles in which the grains of gold might be deposited. Notwithstanding the fact that cinnabar occurs abundantly in both Mexico and Peru, the production of mercury from this mineral and the use of the amalgamation process for extracting gold from its ores were unknown to the Indians prior to the mining operations of the Spaniards.

The nuggets and grains of gold which were gathered by the Incas and Aztecs from different tributary tribes were melted in small charcoal furnaces, the workmen furnishing a blast by blowing through tubes. The melted gold was then cast into bars,

(2) "Primitive Copper Working, An Experimental Study," *American Anthropologist O. S.* Vol. VII, No. 1, 1894.

from which the native craftsmen wrought the countless vessels, ornaments and other beautiful objects that excited the wonder and cupidity of the Spanish conquerors. It is only by viewing some of these ancient works of art in a museum or in a collection such as that recently uncovered at Monte Alban in Mexico that one can form an adequate idea of the character and extent of the stolen treasures which the followers of CORTES and PIZARRO carried away.

The plating of copper and bronze with gold was another accomplishment of the ancient craftsmen of Mexico and Peru. The objects were probably overlaid with thin sheets of the precious metal and heated in a furnace but the details of the process are not known.

The metallurgy of silver, among the American aborigines, reached its highest development in Peru. Small portable furnaces, called *huayres* in the Quichua language, were placed upon mountains whenever there was a strong wind.

" These furnaces," writes HUMBOLDT (3), " were cylindrical tubes of clay, very broad, and pierced with a great number of holes. The Indians threw in layers on layers of silver ore, galena and charcoal ; and the current of air which entered at the holes into the interior of the *huayre* quickened the flame, and gave it a great intensity. When they perceived that the wind blew too strong, and that too much fuel was consumed, they carried their furnaces to a lower situation.

" The argentiferous masses, which came out of the huayres established in the mountains, were resmelted in the cottages of the Indians, by means of the old process of blowing the fire by ten or twelve persons at once, through tubes of copper, of one or two metres in length, and pierced at the lower extremity with a very small hole."

The losses of silver by this primitive method of smelting, as HUMBOLDT remarks, must have been enormous. Yet this old Indian process was used by the Spaniards at the silver mines of Potosi until the introduction of amalgamation.

It was for the many valuable drugs and medicines which were first brought to their attention that the European explorers owed the greatest and most lasting obligations to the American aborigines. The medicinal and narcotic plants, gums and balsams,

(3) " Kingdom of New Spain " London, 1811, vol. 3, p. 376.

used by the Indians, such as cinchona, sarsaparilla, vanilla, jalap, coca, tobacco, capsicum, guaiacum, cascara, etc., that have found a place in modern pharmacopoeias, are too numerous for mention. It seems as if the aboriginal native in his long intimate contact with plant life must have tested upon himself the physiological effects of every kind of root, bark, leaf, flower and seed that came to his attention. The specific actions of different plants as poisons, antidotes, narcotics, emetics, cathartics, diuretics, sudorifics, etc., were observed and the knowledge thus acquired became a tribal possession, being transmitted by custom and tradition from one generation to another.

The Indian remedies that came to the attention of the early colonists were generally slow in obtaining official recognition. *Hydrastis*, used as a remedy by the Cherokees and later by the early settlers, did not attract medical attention until 1798; it is now an important drug in all pharmacopoeias. *Lobelia* was long known as a medicine among the North American Indians, before Dr. CUTLER of Massachusetts introduced it to the medical profession. Ipecac, although for centuries in common use among the natives of Brazil, was not employed in Europe until 1672. The popularity of some of the Indian remedies, when once physicians began to prescribe them, became so great in some cases as almost to cause the extinction of the plant. Pinkroot, for example, which was used by the Indians as a vermifuge, was supplied to the drug markets by the Creek and Cherokee tribes of Georgia in large bales. The plants were pulled up by the roots and this ruthless destruction led to its complete extermination in many sections.

Lack of space prevents the further discussion of a field to which the manufacture of many pharmaceutical extracts and the chemical industries of quinine, cocaine and other alkaloids, trace their first beginnings.

The medicinal herbs employed by the American Indians were taken mostly in the form of decoctions. Drug preparation reached its highest state among the tribes of Mexico and Peru. CORTES found in Mexico apothecary shops where every sort of root and plant was sold as well as prepared medicines, liquids, ointments and plasters. Aromatic waters, perfumes, odoriferous gums, and distilled balsams were also prepared.

The toxic properties of different plant extracts were utilized by the American aborigines in some cases to considerable practical advantage. The bark of walnut root, soap root, horse chestnuts and other materials were used by different tribes for fishing. Decoctions of the powdered materials when cast into pools had a stupefying action upon the fish so that they rose to the surface of the water and were easily taken.

Some of these Indian fish-killing plants, such as the South American *cubé*, are now being utilized for the extraction of the insecticidal substance rotenone. Here, as in so many other cases, the practice of native aboriginal tribes was the first stepping stone to a modern chemical industry.

Probably no single chemical discovery of the American aborigines excited so great a wonder and interest among Europeans as did the famous arrow poison *curare* prepared by the South American Indians from the aqueous extract of the *Strychnos toxifera* and other related plants. This poison though harmless in large doses when introduced into the alimentary canal, is quickly fatal, even in minute amounts, if allowed to penetrate through a wound into the blood stream. It was used with great effectiveness by the Indians both in hunting and warfare, and was afterwards employed therapeutically, to a limited extent, in European countries for the treatment of severe spasmodic affections such as tetanus and rabies.

HUMBOLDT in his Narrative of Travels to the Equinoctial Regions of America (4) has given a pleasing picture of an old Indian engaged in the manufacture of *curare* on the banks of the Upper Orinoco. As it is the best account of primitive chemical industry among the aborigines of America that has been written, the passage is quoted in part.

"We were fortunate enough to find an old Indian more temperate than the rest, who was employed in preparing the *curare* poison from freshly gathered plants. He was the chemist of the place. We found at his dwelling large earthen pots for boiling the vegetable juice, shallower vessels to favour the evaporation by a larger surface, and leaves of the plantain-tree rolled up in the shape of our filters, and used to filtrate the liquids, more or less loaded with fibrous matter. The greatest order and

(4) Vol. II (London, 1907), p. 439.

neatness prevailed in this hut, which was transformed into a chemical laboratory. The old Indian was known throughout the mission by the name of the poison-master *(amo del curare)*. He had that self-sufficient air and tone of pedantry of which the pharmacopolists of Europe were formerly accused. 'I know,' said he, 'that the whites have the secret of making soap, and manufacturing that black powder which has the defect of making a noise when used in killing animals. The *curare* which we prepare from father to son, is superior to anything you can make *down yonder* (beyond sea). It is the juice of an herb which kills silently, without any one knowing whence the stroke comes.'

"This chemical operation, to which the old man attached so much importance, appeared to us extremely simple. The liana (bejuco) used at Esmeralda for the preparation of the poison, bears the same name as in the forests of Javita. It is the *bejuco de Mavacure*, which is gathered in abundance east of the mission, on the left bank of the Orinoco, beyond the Rio Amaguaca, in the mountainous and rocky tracts of Guanaya and Yumariquin. Although the bundles of *bejuco* which we found in the hut of the Indian were entirely bare of leaves, we had no doubt of their being produced by the same plant of the strychnos family (nearly allied to the *rouhamon* of Aublet) which we had examined in the forest of Pimichin. The *mavacure* is employed fresh or dried indifferently during several weeks. The juice of the liana, when it has been recently gathered, is not regarded as poisonous; possibly it is so only when strongly concentrated. It is the bark and a part of the alburnum which contain this terrible poison. Branches of the *mavacure* four or five lines in diameter are scraped with a knife, and the bark that comes off is bruised, and reduced into very thin filaments on the stone employed for grinding cassava. The venomous juice being yellow, the whole fibrous mass takes that color. It is thrown into a funnel nine inches high, with an opening four inches wide. This funnel was of all the instruments of the Indian laboratory that of which the poison-master seemed to be most proud. He asked us repeatedly if, *por alla* (out yonder, meaning in Europe), we had ever seen anything to be compared to this funnel *(embudo)*. It was a leaf of the plantain-tree rolled up in the form of a cone, and placed within another stronger cone made of the leaves of the palm-tree. The whole of this apparatus was supported by a slight frame-work made of the petioles and ribs of palm-leaves. A cold infusion is first prepared by pouring water on the fibrous matter which is the ground bark of the *mavacure*. A yellowish water filters during several hours, drop by drop, through the leafy funnel. This filtered water is the poisonous liquor, but it acquires strength only when concentrated by evaporation, like molasses, in a large earthen pot. The Indian from

time to time invited us to taste the liquid ; its taste, more or less bitter, decides when the concentration by fire has been carried sufficiently far. There is no danger in tasting it, the *curare* being deleterious only when it comes into immediate contact with the blood. The vapours, therefore, which are disengaged from the pans are not hurtful, notwithstanding all that has been asserted on this point by the missionaries of the Orinoco...

" The most concentrated juice of the *mavacure* is not thick enough to stick to the darts ; and therefore, to give a body to the poison, another vegetable juice, extremely glutinous, drawn from a tree with large leaves, called *kiracaguero*, is poured into the concentrated infusion...

" At the instant when the glutinous juice of the kiracaguero-tree is poured into the venomous liquor well concentrated, and kept in a state of ebullition, it blackens, and coagulates into a mass of the consistence of tar, or of a thick syrup. This mass is the *curare* of commerce...

" The old Indian, who was called the poison-master, seemed flattered by the interest we took in his chemical processes. He found us sufficiently intelligent to lead him to the belief that we knew how to make soap, an art which, next to the preparation of *curare*, apeared to him one of the finest of human inventions..."

The old Indian poison-master whom HUMBOLDT has so picturesquely described was in every sense of the word a chemist and one fully competent to meet the simple needs of his place and time. He had acquired from long instruction and experience technical knowledge of a highly specialized kind in which he took a legitimate pride and satisfaction, even as is done by members of the chemical profession among civilized nations. His case was typical of thousands of aborigines in the Western Hemisphere who long before America was discovered, were working upon dyes, pigments, pottery, starch, sugar, salt, metals, medicines and other products of the chemist's art. Their apparatus was primitive, yet the mortars, grinding plates, shredders, evaporating vessels, leaching and filtering baskets, ovens, furnaces, and other utensils, which the aborigines of America used and which can be seen today in museums, are full of meaning, for it was from just such simple beginnings that the processes and appliances of modern chemistry have sprung.

The great scientist HUMBOLDT could learn something even from the savage Indian chemist. The picture of these two in the primitive laboratory by the Orinoco is symbolic of the opposite

extremes of human culture and furnishes a theme which might well be made the subject of a painting.

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Thegenesis of prehistorical research

The problems connected with prehistory, the antiquity of man and the general character of the life of primitive man engaged the attention of the ancients. But their answers based on myth and speculation not only failed to solve these problems, but did not even establish a basis for future progress. We may say perhaps that HESIOD was among the first to be interested in prehistory. But his speculations with reference to the history of man or his origin have hardly been helpful. Influenced by the current mythology and his own gloomy outlook, he described the history of man as a continuous degradation and degeneration from an age of gold to one of baser metal, iron (1). At the same time he seems to have had some notion about primitive life. Primitive man, he believed, was a forest dweller who did not raise corn, but lived on acorns and beechmast (2). He also speculated concerning man's origin, holding that all men descended from stones dropped by DEUCALION and PYRRHA; only the men of Aegina descended from ants (3). Why these Aeginians should have been so differentiated from the rest of mankind, the records vouchsafe no answer. But if we wish, we can read into that myth an incipient evolutionary theory.

The Ionian philosophers of the sixth and fifth centuries had abandoned popular mythology and relied on reason and observation. And their speculations clearly hinted at an evolutionary development of life. But as they were not subjected to rigorous and painstaking investigations, they never emerged from the speculative stage into the realm of fact (4).

Another road to progress in prehistory lay in the direction of a

(1) HESIOD, *Works and Days*, lines 107-137.

(2) *Anthropology and the Classics*, (R. MARETT, edit.) Oxford, 1908, p. 128.

(3) *Ibid.*, p. 128.

(4) See DIOGENES LAERTIUS, *Lives and Opinions of Eminent Philosophers*; BAKEWELL, *Source Book in Ancient Philosophy*.

science of geology, insofar as that science could throw light on the antiquity of man. In this field the ancients were decidedly accurate in their observations. In noticing marine fossils on dry land, ancient writers concluded that such a situation could only have resulted from an alternate recession and inundation of waters, from earthquakes, volcanic eruptions and the like events (5). Unfortunately they were not tempted to investigate the successive changes that the earth had undergone before it had attained its present physical condition and configuration.

What is more deplorable is that later thinkers beginning with THEOPHRASTUS obscured the correct observations of Greek scientists and geographers with their own erroneous conjectures. For many centuries fossil formations were explained as a result of a plastic force in the earth that imitates the formation of organic bodies (6). Exceptions, it is true, can be listed. AVICENNA, for instance, in the eleventh century explained fossil formations in the manner of the Greeks (7). Then, in the sixteenth century, LEONARDO DA VINCI (8), FRACASTORO (9), PALISSY (10), and CARDANO (11) combated both the plastic force theory as well as the theory of celestial influence. But the great majority of medieval scholars adhered to the wrong explanation. As late as the eighteenth century a correct explanation of fossils was still rare (12). It was not until the opening of the nineteenth century that the importance of fossils was finally recognized. At last it was understood, as a result of the work of WILLIAM SMITH, that fossils could be used to determine the relative age of earth strata.

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(5) See HERODOTUS, *History*, II, 12; STRABO, *Geography*, T. III, 4; ARISTOTLE, *On Meteors*, I, 14.

(6) GEIKIE, A., *The Founders of Geology*, London 1905, p. 16.

(7) *Ibid.*, p. 45.

(8) L. DA VINCI, *Literary Works*, Vol. II, Bk. XVI, Ch. VI (p. 216 in J. P. RICHTER's edition).

(9) K. VON ZITTEL, *History of Geology and Paleontology*, London 1901, p. 14 (tr. by OGILVIE-GORDON).

(10) H. MORLEY, *Life of Bernard Palissy*, Vol. II, p. 163.

(11) A. GEIKIE, *opus. cit.*, p. 51.

(12) " VOLTAIRE claimed that the shells on the mountain tops had been thrown aside by Pilgrims on their journeys to Rome, and that petrified fishes were the remains of their unfinished repasts "—H. F. OSBORN, *From the Greeks to Darwin*, N. Y. 1929, pp. 163-164. See VOLTAIRE, *Des Singularités de la Nature*, ch. XII.

II

The speculative character of ancient and medieval opinion was not alone in preventing an understanding of the prehistoric age. Strangely enough (or perhaps not so strangely) the nature of primitive life which could be judged by its material remains completely escaped investigators of those times. In digging up the ground, or many times by mere chance, people discovered shaped flints bearing a very close resemblance to axes and hammers and the like implements. Were they really stone implements made by man? Such a simple answer was unthought of. PLINY said they were thunderstones. They were invariably found in places struck by lightning. Hence they must have fallen from the clouds with the thunder. Furthermore these stones had a supernatural power. They could be used successfully in attacking cities and fleets (13). The greatest naturalist produced by Rome could not be wrong. Hence all scholars accepted PLINY's explanation—even those scholars who in other respects showed marked originality. Thus PARACELSUS (1490-1541), a real innovator and scientific iconoclast, a man who believed in experimentation and denounced all those who relied on fancy and opinion, took pains to explain how these stones grew in the clouds (14). GEORGIUS AGRICOLA (1494-1558), who in his time had gone further than anyone else in the science of metallurgy, showed no originality when he was confronted with the so-called thunderstones (15). He could add nothing to what PLINY had said before him. Nor did the noted Swiss Naturalist, CONRAD GESSNER (1516-1565) (16), express any different attitude. All he could do was to repeat or quote AGRICOLA, CARDANO and KENNTMANN, a lesser known German scholar. All these men testified to the existence of thunderstones in the shape of hammers or other tools. The last named, KENNTMANN, reported that in 1547 a stone of that sort had fallen through a wine cellar

(13) PLINY, *Natural History*, Bk. 37, Ch. 51.

(14) PARACELSUS, T. VON HOHENHEIM, *Sämtliche Werke, Abt.* 1, *Bd.* 13 (KARL SUDHOFF edit.) Berlin, 1931. Bk. II, pp. 221-222.

(15) G. AGRICOLA, *De Natura Fossilium*, Basel 1558, Liber V, p. 257.

(16) C. GESSNER, *De Rerum Fossilium Lapidum*, Basel 1565, Cap. III *De Lapidibus.*

in Vienna and was buried twelve ells in the ground. Another thunderstone had fallen in Torga on May 17, 1561 (17). Such incidents were corroborating evidence.

By the end of the sixteenth century there was a decided change in the climate of opinion with reference to the nature of thunderstones. The discovery of America, resulting in an acquaintance with a primitive race still in the neolithic stage, was no doubt responsible for it. Nevertheless the change was by no means complete. M. MERCATUS' *Metallotheca* (18), written about 1570, well illustrates the extent to which old notions survived and more rational explanations took their place. According to this author, thunderstones, in his time, were divided into two classes, one including polished axes, another flint arrows and small blades. The polished axes, it was still believed, fell with the thunder. On the other hand, flint arrows, the more enlightened argued, must have been used and made by people as implements of war before the use of iron was known. The facts, the author contended, clearly favored that point of view. First there was the biblical evidence pointing to the use of flint knives by the Jews (19). Secondly, he knew that in the western hemisphere no iron was molten in his own time, and all tools were made of stone. Here we can see the beginnings of the comparative method. Unfortunately the book was not published until 1717. And yet even if it had been published earlier, it is doubtful if it would have exercised the right kind of influence. It must be remembered that side by side with the enlightened opinion, the book retained the old superstitions connected with these stones.

A somewhat similar scepticism combined with an equal amount of credulity can be noted in the writers of the seventeenth century. BOETIUS DE BOODT, writing in 1644, included PLINY's account together with a newer explanation that these supposed thunderstones were in fact originally iron implements that had turned into stone. At the same time the author did not dismiss entirely the testimony of " men worthy of belief " according to which such stones were found invariably near a tree or a house struck

(17) J. KENNTMANN, *Catalogus Rerum Fossilium*, Basel 1565, p. 30.

(18) Chapter on thunderstones has been reprinted in *Matériaux pour l'Histoire Primitive et Naturelle de l'Homme*, 1875, pp. 49-57.

(19) See *Exodus* IV, 25, *Joshua* V, 2.

by lightning (20). ALDROVANDUS who wrote the *Museum Metallicum* in 1648, knew that the Romans used flint stone arrows and that the Indians of Mexico employed stone axes. Such knowledge did not prevent him from identifying certain flints with *glossopetra* (21), which according to PLINY resembled a man's tongue and grew in the eclipse of the moon. OLAO WORMIUS (1655), wrote that " some (of these flints) resemble so closely the point of a sword that it is doubtful if they are the work of nature or of art... and others relate them to thunderstones." (22) Only one writer at the close of this period recognized unmistakably these shaped flints as man made implements. In his *Natural History of Staffordshire* (1686), ROBERT PLOT described flints that were " exactly in the form of a bearded arrow jagged at each side with a large stem in the middle." He concluded therefore that " not only are these arrows... all artificial, whatever is pretended, but also that they had anciently some way of working by the tools, which may be seen from the marks " (23).

III

It was not however until the first half of the eighteenth century that thunderstones were at last generally understood to be stone implements of primitive people. Even at the opening of the century when LÉMÉRY was " inclined to believe there was never any such (thunderstone) in truth." His explanation, however, was not very different from the traditional one. He thought it was much simpler to believe that it " might have come from mineral matter melted and formed by brimstone enflamed by the thunder in the earth itself, rather than to think that it was formed in the clouds and hurled by the thunder " (24).

We witness a much sounder attack in the work of the Prussian

(20) BOETIUS DE BOODT, *Le Parfait Joaillier ou Histoire de Pierres*, 1644, Bk. II, Ch. 260-62.

(21) U. ALDROVANDUS, *Museum Metallicum*, Bologna 1648, p. 604, p. 156, 157.

(22) OLAO WORMIUS, *Museum Wormianum*, Leyden 1655, Ch. III, p. 39.

(23) R. PLOT, *opus. cit.*, p. 396.

(24) See *Histoire de l'Académie Royale des Sciences* (1700), 2nd edit. 1734, pp. 147-148.

botanist and mineralogist, HELWING. In 1717 he declared definitely that these thunder hammers, axes and other shaped stones were of an artificial nature, and associated them with the thunder cult of the ancient Goths and other German tribes (25).

The first important paper on the subject presented before the French Royal Academy of Science was that of ANTOINE JUSSIEU in 1723. Not only did he denounce the old belief as a rank superstition, as HELWING had done before him, but explained the artificial character of the flints by the use of the comparative method. Having a number of American flint implements with which to compare those found in Europe, it was very easy for him to announce that " whenever we find stones resembling these types we need not hesitate to regard them as implements corresponding to the steel or iron implements they resemble... It can also be inferred that the primitive inhabitants of France and Germany, before the discovery of iron, were much like the savages of to-day ; hence they must have employed stone implements for the same purpose " (26).

Another essay on the same subject was read before the same Academy in 1730 by MAHUDEL. His chief argument was that the pretended thunderstones have such a close resemblance to iron and bronze implements, that they must have served a similar purpose. Furthermore, references in the Bible to the use of stone knives by the Israelites, and in other writings to the use of a flint stone knife by the priests of Cybele confirmed his conclusion (27).

With this idea established, it was at this time possible to describe the life of primitive man in terms of the implements he employed. True, LUCRETIUS had informed us long ago that the most primitive arms of man were of stone, and that they were succeeded by bronze and later by iron implements. By the middle of the eighteenth century, however, there was additional proof, incontestable proof apart from the testimony of historians. Observation came to strengthen the testimony from literature. This in substance was the contribution made by ECCARD in

(25) *Matériaux*, Vol. X, 1875, pp. 297 et seg.

(26) *Histoire de l'Académie Royale des Sciences* (1723), Vol. I, 1730, p. 9.

(27) *Histoire de l'Académie Royale des Inscriptions et Belles Lettres*, t. XII, 1740, pp. 163-169 contains a summary of M's paper on Thunderstones.

1750 (28) and GOGNET in 1758 (29). In the nineteenth century a number of Danish archaeologists made further refinements in the classification of prehistoric periods, again as a result of more painstaking observation. Among them was the archaeologist, WORSAAE. As a result of his practical researches, he noted, for example, that copper was used before iron, because it was found in a comparatively pure state and required little smelting, whereas iron in its rough state bore too close a resemblance to stone to attract the attention of primitive man (30).

IV

The mere knowledge, however, of the existence of a stone age could hardly yield an adequate understanding of prehistoric times. There was still the question of the antiquity of that age—of the antiquity of man—to be answered, before the primitive world could come clearly into view. This the rationalists of the eighteenth century failed to answer. They failed not because they lacked the scientific spirit, but because their science was still slightly tinged with a devotion to theology. The great BUFFON is a case in point. Had it not been for his allegiance to Biblical cosmology, there is no doubt that his researches would have led him to the belief in the high antiquity of man. His argument for man's late appearance was a *tour de force* to substantiate Genesis (31).

But even at the opening of the nineteenth century the life of primitive man was little understood; nor was there an appreciation of his high antiquity. In fact it seemed that science was about to confirm what had long ago been revealed in Genesis. CUVIER's Catastrophism seemed to afford a scientific basis for the Noachian deluge and the special creation theory. CUVIER had made a careful study of stratified rocks and their organic

(28) ECCARDUS, *De Origine Germanorum*, 1750, cited by M. BOULE, *Les Hommes Fossiles*, Paris (2nd edit.), 1923, p. 4.

(29) GOGNET, *Les Origines des Lois, des Arts et des Sciences*, Paris 1758, t. I, Liv. II, p. 148-149.

(30) J. J. WORSAAE, *Primeval Antiquites of Denmark*, tr. into Eng. by THOMAS, London 1849, p. 23-24.

(31) See BUFFON, *Histoire Naturelle* (N. edit.) Paris, 1808, T. III, pp. 398-99.

contents. He had found the remains of extinct mammalia of a very remote period, but no human fossils among them. Furthermore the efforts of fellow scientists in the same direction were equally futile. When SPALLANZANI presented him with a collection of bones he had unearthed, and which he thought represented human remains, CUVIER found there was not one human bone among them. Then SCHEUCHZER thought he had found the skeleton of *homo diluvii testis*. When CUVIER examined it he found it was that of a salamander and not of a man. Finally he refused to admit as authentic the human remains found at Canstadt, for the reason that the earth had been dug up carelessly, without noting the different levels in which each item was found (32). As a result of all this negative evidence he concluded that man was not a contemporary of the extinct mammalian fossils of a remote period (33). On the contrary, thousands of ages preceded man and thousands of animals that never were contemporaneous with him. But he added cautiously "I do not wish to conclude that man did not exist at all before this epoque... (i.e. the last catastrophe). Perhaps also the places he inhabited were completely destroyed and his bones were buried in the depths of the sea" (34). The orthodox geologists, however, did not pay as much attention to this last reservation as to his theory of catastrophies. As a result it was this influence of CUVIER which continued for a much longer period in the nineteenth century than the facts of science warranted.

V

Opposition to Catastrophism, however, was not long in developing. Long before CUVIER the Noachian flood had been brought into question by DA VINCI (35), FRACASTORO, VOLTAIRE (36) and LINNAEUS (37). And before the close of the eighteenth

(32) G. CUVIER, *Discours sur les Révolutions de la Surface du Globe*, 8 éd., 1840, pp. 137-139.

(33) *Ibid.*, p. 144.

(34) *Ibid.*, p. 144.

(35) *Opus. cit.*, pp. 216-218.

(36) VOLTAIRE, *Dictionnaire Philosophique*, see art. *Inondation.*

(37) K. VON ZITTEL, *opus. cit.*, p. 117.

century, HUTTON and PLAYFAIR came to the conclusion that geological evidence pointed to the high antiquity of the earth. Furthermore, they said that the physical and chemical causes effecting geological changes in the present age were sufficient to account for all earlier changes (38). Then at the opening of the new century a direct attack on Catastrophim was begun by VAN HOFF in Germany and CONSTANT PRÉVOT in France. Both these men repeated the arguments of HUTTON and PLAYFAIR, and discredited the possibility of a universal flood (39). But as neither of these critics presented sufficient data to substantiate their claims, their criticism had little effect. The strength of Catastrophism lay in that it explained the great disproportion between the slow and almost imperceptible changes of the present, with the revolutionary biological and geological changes of the past, which the physical data apparently revealed. It remained for CHARLES LYELL to establish the theories of HUTTON on a firm foundation of geological data. This he achieved in his *Principles of Geology* (1830-1833), in which he presented sufficient evidence to explain "former changes of the earth's surface by reference to causes now in operation." (40)

But even before the publication of LYELL's first volume scholars of anthropology in the University of Montpellier, MARCEL DE SERRES, DE CHRISTOL, TOURNAL and others, as a result of excavations they had made in the caves of southern France claimed that they had found human fossils belonging to an antediluvian period. Although LYELL and others finally agreed that the human fossils and those of extinct quadrupeds discovered with them were not contemporaneous inhabitants of an antediluvian epoch, their strictures on Catastrophism were not without importance. Already in 1829, TOURNAL understood the important inferences that might be drawn from the science of geology. He said, "geology in supplementing our brief annals will go to awaken man's pride in showing him the antiquity of his race; because geology alone can give us an idea of the period of man's first appearance on the terrestrial globe" (41). He also argued it

(38) K. VON ZITTEL, *opus. cit.*, p. 72.
(39) *Ibid.*, pp. 187-189.
(40) See title page of LYELL's *Principles.*
(41) *Annales des Sciences Naturelles*, XVIII, 1829, p. 258.

was not necessary to have recourse to Catastrophism or to supernatural phenomena to explain the complete destruction of the species found in the caves. He pointed to the simple natural causes, such as the presence of human societies and changes of temperature, which in historic times brought about the diminution and disappearance of certain mammals once very common, as the camel and the hyena. Their destruction took place slowly and gradually and not as a result of any catastrophe. These same or similar causes he assumed must have operated in the more remote prehistoric past (42). In like manner, DE CHRISTOL argued that, apart from the evidence which he thought he had found but which was disputed, " the opinion of the non-existence of man in a fossil state was founded entirely on negative facts the value of which could more often be exaggerated than legitimately deduced from the known principles upon which the science rests " (43). That is to say, theoretically there was no justification for the assumption of man's late appearance. Only the evidence, the human fossil, to disprove this assumption was still lacking; therefore, DE CHRISTOL could not answer CUVIER's telling question—" where then is this human species? Did this last and perfect work of the Creator exist anywhere? " (44). But he did say that if no human fossil had as yet been discovered, it could not be denied that it may be discovered in the future.

Yet there was evidence of the high antiquity of man even at that time, of which both CUVIER and DE CHRISTOL were ignorant. As early as 1774 a German Protestant minister, J. A. ESPER, had visited the cave of Gailenreuth in Bavaria where he found together with the remains of the cave bear, a fragment of a human jaw and of a shoulder blade (45). But his discovery passed unnoticed. Again in 1797 the Englishman JOHN FRERES wrote a letter to the secretary of The Royal Society. He reported that in a cave in Hoxue he found flint stone implements, a jaw

(42) *Ibid.*, p. 245.

(43) DE CHRISTOL, *Notice sur les Ossements Humains Fossiles*, Montpellier, 1829, p. 25.

(44) *Ibid.*, p. 6.

(45) P. C. SCHMERLING, *Recherches sur les Ossements Fossiles*, 1833, p. 58, also J. A. ESPER, *Description des Zoolithes nouvellement Découvertes.*

bone with teeth in it, of an enormous size, of an unknown animal, and a huge thigh bone. He said, " the situation in which those weapons were found may tempt us to refer man to a very remote period indeed; even beyond that of the present world " (46) Apparently no one paid any attention to his discovery or his conclusions.

Evidence however of a character which could no longer be ignored was brought to light by PHILIPPE-CHARLES SCHMERLING in 1833. The son of a physician in Delft, SCHMERLING (47) began the practice of medicine in Liége about 1825. Four years later he abandoned medicine for archaeology as a result of a chance happening. And it was in this field that he achieved distinction. While taking care of a patient working in the quarries of Chokier, he noticed the man's children playing with bones of an extraordinary shape and size. On inquiry, he was told by the man that one cave which had been discovered in the course of the quarrying, contained many such bones. The poor man saw nothing remarkable about them. He said the cave must have been an ancient cemetery. But SCHMERLING immediately realized that he had come upon fossil bones of great interest. He was fascinated by the idea of studying them. From 1829 to 1833 he devoted himself entirely to the exploration of more than forty caves of Liége, and to the study of comparative anatomy. In 1833 he published the results of his researches. He found there not only rude flint implements and cut bone but human fossils, all mixed up in the same debris with the remains of extinct as well as extant quadrupeds (48).

Here was evidence of the first order of man's high antiquity. But even the best of scientists was sceptical. CHARLES LYELL visited SCHMERLING and examined his fossils. He was not convinced. He still expressed doubt as to man's contemporaneity with the extinct mammals. In that case, SCHMERLING observed, he would also be compelled to doubt the coexistence of many of the extant animals, the bones of which he had found in the

(46) *Archaeologia* XIII (1800), pp. 204-205, *tr. par* J. F. ISENFLAMM, Nuremberg, 1774, *fol.*

(47) See P. C. SCHMERLING (1791-1836), in *Biographie Nationale de Belgique* (vol. 21, 728-34, 1913; by LÉON FRÉDERICQ).

(48) P. C. SCHMERLING, *opus. cit.*, p. 177.

same mud with the bones of extinct mammals (49). It was only in later years that LYELL admitted that SCHMERLING's discoveries merited more weight than he was willing to acknowledge in 1833. In the volume of his *Principles* which he published in 1834 he cited SCHMERLING's opinions without questioning their worth, but also without definitely approving them.

The Belgian physician and paleontologist, however, was quite sure of his ground. He attached very great importance to the cut bone and the artificially shaped flints that he unearthed. Even if he had not found the human bones in a condition favorable for classification as of a remote antiquity, he thought that the flint implements and the cut bone alone were sufficient proof of man's existence in an antediluvian period (50).

At the same time that SCHMERLING was exploring the caves of Liége a Roman Catholic priest, M'HENERY, found in a cave called Kent's Hole not only bones of the mammoth, rhinoceros and other extinct mammalia, but several flint implements and human remains of a later date (51). Then in 1840, R. A. C. GODWIN-AUSTIN communicated a paper to the Geological Society on " Bone Caves in Devonshire." He stated that " works of art such as arrow heads and knives of flint occur in all parts of the cave, and throughout the thickness of the clay; and no distinction founded on condition, distribution or relative position can be observed whereby the human can be separated from the other *reliquiae*," which included teeth and bones of the elephant, rhinoceros, ox, deer, bear and a feline animal of a large size (52). By 1840, then, there was evidence from the different sources of the coexistence of man with extinct quadrupeds of a high antiquity.

Thus far, the reader will have noticed, the human remains were found only in caves. The remains of animals both of extinct and of living species, on the other hand, were found throughout Europe in ancient river-gravel as well as in caves. Hence the question was raised, if man was to be considered a contemporary

(49) CHARLES LYELL, *The Antiquity of Man*, Phila., 1863, p. 68. See also an interesting letter of his to D. MANTELL, dated Sept. 16, 1833 in *Life, letters and journals of Sir* CHARLES LYELL, Bart. (vol. 1, 401, 1881).

(50) P. C. SCHMERLING, *opus. cit.*, p. 178.

(51) CHARLES LYELL, *opus. cit.*, p. 97.

(52) J. EVANS, *Ancient Stone Implements of England* (2nd edit.), London, 1897, p. 490.

of the extinct mammalia,why were none of his remains to be found outside the caves? It was finally discovered that human remains did exist in those places. The first to lead the way in such a discovery was BOUCHER DE PERTHES. But a number of obstacles had to be removed before anyone would dare follow.

BOUCHER DE PERTHES (1788-1868) (53), labored under two difficulties. In the first place he was an innovator, whose discoveries if considered authentic, were a death blow to Catastrophism; and CUVIER still had loyal followers in France. Secondly, he had no standing among professional paleontologists. He was only a *dilettante*. Succeeding his father as customs official in his native town of Abbeville, he divided his time between his work in the customs office and literary labors of a sort. He wrote on a variety of subjects. At one time he composed plays, ballads and romances. In 1830 he published a pamphlet on free trade, which nobody cared to notice except RICHARD COBDEN (54). As a member of the Learned Society of Abbeville, he presented one paper on woman's place in society and another on memory and instinct (55). In addition he wrote a number of volumes on creation, and between 1805 and 1860, seven volumes of letters. Nevertheless, these labors could not absorb his interest completely. " Rest is not a part of my being," he said, " I would be like a fish out of the water, who, if he fell asleep under the sun, would never again wake up. I couldn't live a month without work. Literature was not enough for me " (56). And so he turned with enthusiasm to paleontological research, to which he had been attracted for a long time.

At the time that SCHMERLING was exploring the caves of Liége, BOUCHER DE PERTHES had already begun his search for human remains in the diluvial deposits in the neighborhood of Abbeville. Already in 1836 he had arrived at the conclusion that bones and implements or arms of primitive man ought to be found in the alluvial gravel. He developed the idea at some length in his

(53) See *Inauguration de la Statue de Boucher de Perthes* in *Status Catalogues et Notices*, 1909, for biographical details.

(54) B. DE PERTHES, *Sous dix Rois* (1791-1860), Paris, 1863-1866, Vol. VII, p. 553.

(55) B. DE PERTHES, *De la Femme dans l'État Social*, Abbeville, 1860; *Des Idées Innées : de la Mémoire et de l'Instinct*, Paris 1867.

(56) *Inauguration de la Statue*, pp. 11-12.

voluminous work, *La Création: Essai sur l'Origine des Êtres* (1838) (57). He knew that the implements he would finally unearth would be quite different from the polished axes and barbed arrows of the recent stone age. Like TOURNAL and SCHMERLING he argued that primitive man belonged in an epoch of a far higher antiquity than was commonly believed, and that the weapons and implements he used would be found to be very crude. When he first discovered a number of such flint stones, their workmanship was so crude that it was hardly recognizable (58). It was difficult for him to see the least trace of man's hand in any of them. Nevertheless he continued his work. In many places he visited, he found nothing at all. But one day, on the bank of the river not far from his home, he discovered a flint stone about five inches long which bore unmistakable traces of the hand of man. He promptly submitted it to several archaeologists. But none of them saw anything more than a flint stone, accidentally chipped by the workmen who were extracting it. In vain did he insist that the fracture was ancient (59).

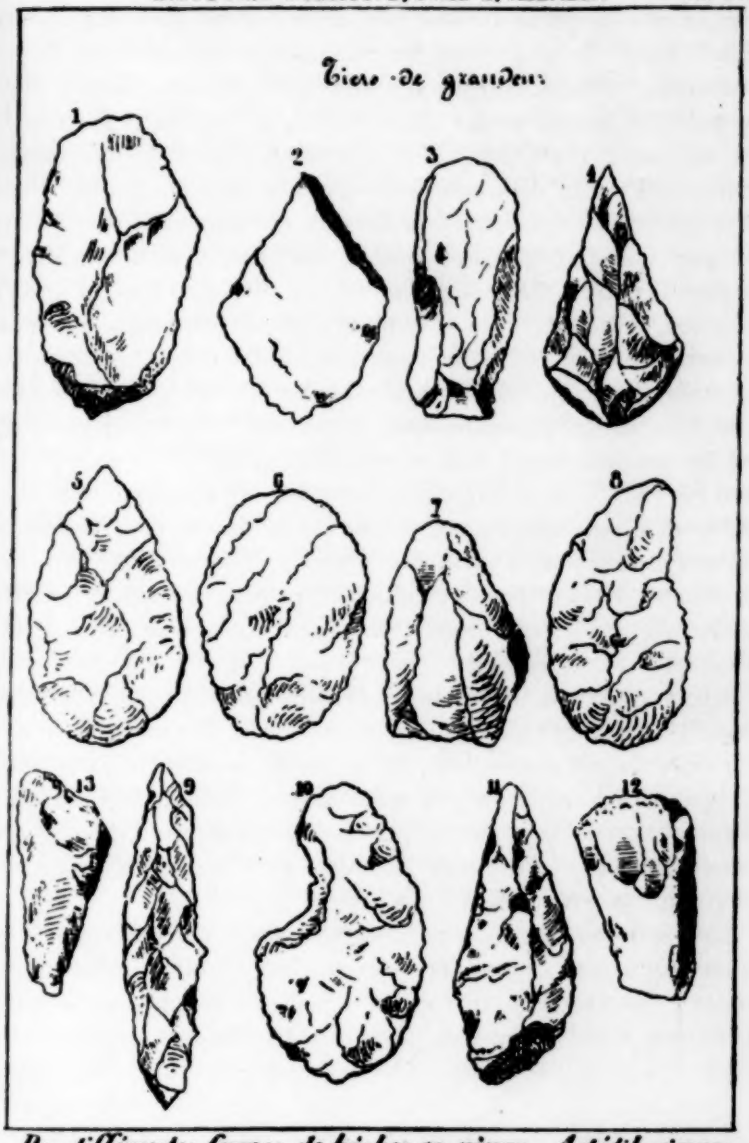
He was not shaken in his conviction. In 1839 he brought his collection of flint axes to Paris and submitted it to some members of the Institute. Again no one paid any attention. In 1840 he submitted a score of flints which had been found together with the remains of extinct mammals, and in which the work of the human hand could no longer be denied. This time two of his friends yielded, AL. BROGNIARD and C. PREVOT. But the practical men led by E. DE BEAUMONT, the president of the Institute, were not at all impressed by his new finds. Although they no longer doubted his honesty, they doubted his good sense. When in 1846 he published the first volume embodying the results of his research, no one took the trouble to review the book. It was stillborn. In later years he said in a somewhat humorous vein, " it is impossible to convince the Parisians; they seem to fear that this discovery might whiten their beards. They hold on to their youth and they refuse at any price to be the contemporaries of the mastodon and the

(57) *Sous dix Rois*, Vol. VII, p. 554.

(58) B. DE PERTHES, *Les Antiquités Celtiques et Antédiluviennes*, Paris, 1849, Vol. II, p. 36.

(59) *Ibid.*, p. 36.

INDUSTRIE PRIMITIVE, TOME 2, CHAP. XXII. PL. VI



Des différentes formes de hâches en pierre. Antédiluviennes.

bos primigenius. These giant antediluvian beasts have become their *bêtes noires*, and by the way, I too, although I am not as heavy" (60). In 1847-1849 he published the same book under a new title, *Antiquités Celtiques et Antédiluviennes*, hoping that the new title might attract the attention of the learned. But it was not until 1850 that E. M. DE MARSY of the Antiquarian Society of Picardy reviewed the work, and read his paper before the members of the Learned Society of Abbeville (61). The reviewer was favorably impressed. He felt that the evidence presented went a long way in solving the problem of man's antiquity. And yet even this belated recognition was too local to have any effect. In the meantime, RIGOLLOT, a well known archaeologist at the time, was carrying on similar researches in St. Acheul, in the neighborhood of Amiens. In 1854 he reported that he too had found flint stones bearing definite traces of the hand of man. In a letter to BOUCHER, he admitted that "in this work I can hardly do anything but follow in your footsteps, and my sole ambition is to prove that you were right, in being the first to declare that our country had been inhabited by men before the cataclysm which destroyed the elephant and the rhinoceros that lived here." (62)

Recognition was beginning to come at last. In 1858 the English Paleontologist FALCONER examined the collection and was very much impressed. In a letter to JOSEPH PRESTWICH he agreed that there was "a great deal of presumptive evidence in favor of his (DE PERTHES') many speculations regarding the remote antiquity of these industrial objects and their association with animals now extinct" (63).

Although the Englishman FALCONER was favorably inclined, French scientists were not yet convinced. The Academy of Amiens, for example, refused to accept his theory. In a letter answering their arguments BOUCHER DE PERTHES repeated the ideas of earlier scholars. He pointed out that the extinct

(60) *Sous dix Rois*, Vol. VII, Jan. 10, 1859.

(61) E. M. DE MARSY, *Rapport fait à la Société Impériale d'Émulation d'Abbeville*, 1855.

(62) *Ibid.*, p. 25.

(63) *Life and letters of Joseph Prestwich* (edit. by Mrs. PRESTWICH), London, 1899, p. 119.

quadrupeds like the mastodon, the elephant and the quadrumane could not have existed but under similar conditions as man. " But if these animals existed on earth, why should not man have lived?... If he did not exist then, why does he exist now? True, the animals were created first. But man followed immediately. Reason says it and the facts prove it " (64).

Finally in September 1859 JOSEPH PRESTWICH, an eminent authority on stratigraphy, presented the results of his investigation of the Abbeville collection and of the deposits in which the flints were found. It was a complete victory for prehistory. The flint implements, he announced, were the work of man, and were unmistakably connected with the debris of extinct races. Furthermore the period in which they belonged was one of the last in geologic time and prior to the time when the earth received its present form (65).

Later in the same year CHARLES LYELL confirmed all that PRESTWICH had said (66). Then the French paleontologist ALBERT GAUDRY went to Amiens where he unearthed nine axes embedded fifteen feet underground together with the remains of extinct and extant quadrupeds (67). This corroborating evidence prompted GEOFFROY ST. HILAIRE to present BOUCHER's ideas before the Anthropological Society of Paris (68). At the Institute, however, opposition still continued. ELIE DE BEAUMONT is reported to have said in 1863, " I don't believe that the human species was contemporaneous with the elephant *primigenius*. The opinion of M. CUVIER is a creation of genius; it is not destroyed " (69). But CUVIER's authority could no longer withstand the new data of science. Prehistory had at last found a scientific footing. Since that time its progress was certain and continuous.

Cambridge, Mass. PHILIP SHORR.
Dec. 1933.

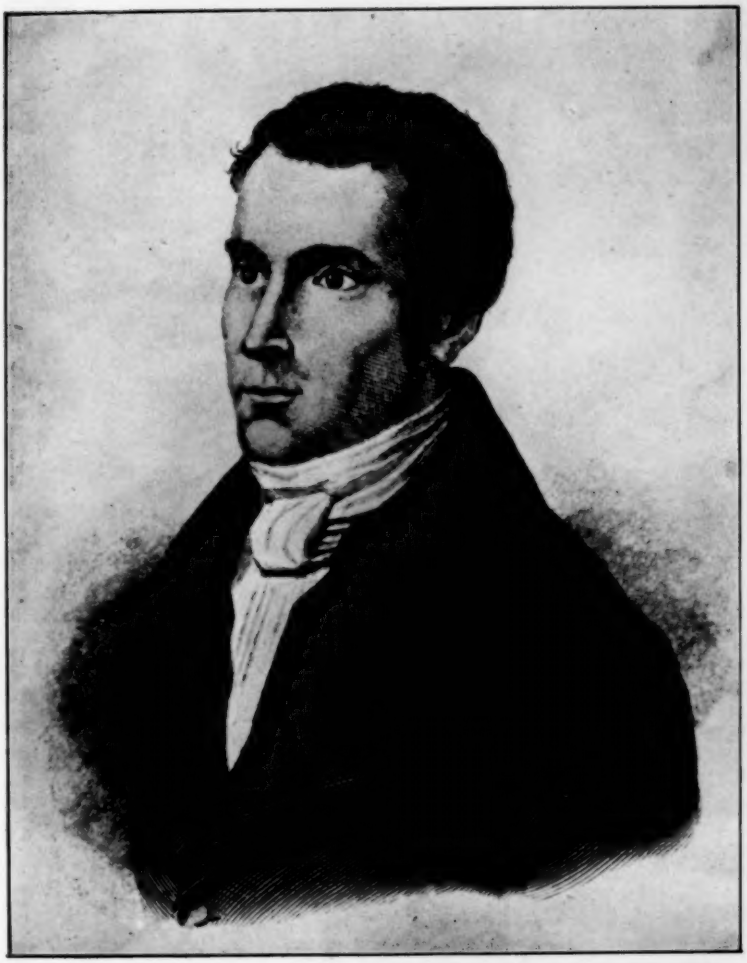
(64) *Sous dix Rois*, Vol. VII, p. 337.
(65) CHAS. LYELL, *opus cit.*, p. 103.
(66) *Inauguration, etc.*, p. 23.
(67) CHAS. LYELL, *opus cit.*, p. 104.
(68) *Inauguration*, etc., p. 24.
(69) M. BOULE, *opus cit.*, p. 13.

CHRONOLOGICAL SUMMARY

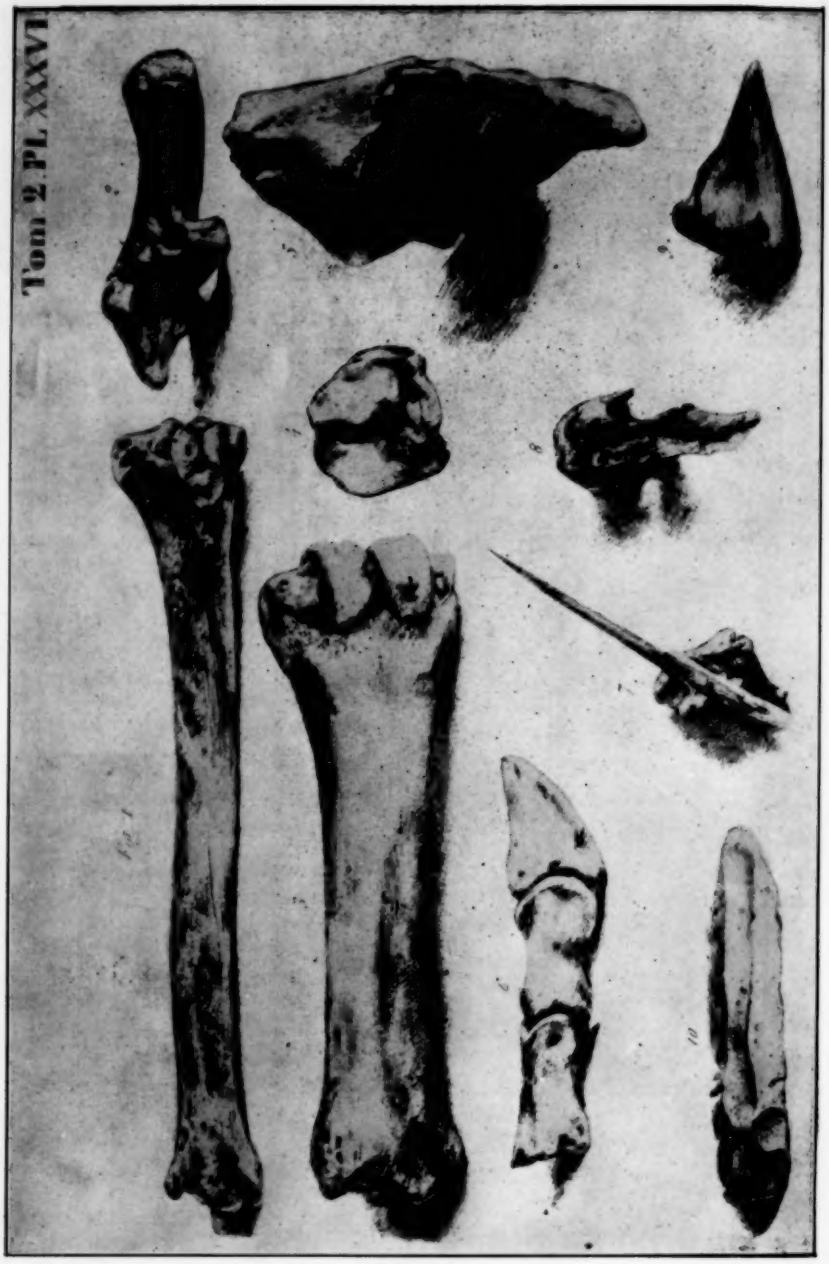
1. 1686. ROBERT PLOT, The first to recognize artificial nature of thunderstones.
2. 1717. G. A. HELWING, in *Lithographia Angeburgia*, denounced belief in thunderstones as rank superstition.
3. 1723. A. JUSSIEU compared thunderstones with American neolithic flint implements, concluding the former to be man made implements.
4. 1730. MAHUDEL compared thunderstones with metal implements, concluding thunderstones were stone implements.
5. 1750. ECCARDUS. *De Origine Germanorum*, first classification of Prehistoric Period, after LUCRETIUS, into stone and metal ages.
6. 1758. GOGUET. Similar classification.
7. 1774. J. F. ESPER, (1732-1781) *Ausführliche Nachricht von neuentdeckten Zoolithen*; probably the first to find human remains in the debris of extinct mammalia of a remote antiquity.
8. 1797. JOHN FRERES, Discovered flint implements in Cave of Hoxne mixed with the remains of extinct quadrupeds.
9. 1833. P. C. SCHMERLING, *Recherches sur les Ossements Fossiles*, discovered flint and bone implements together with remains of extinct mammals, in more than forty caves of Liége. He considered these as evidence of man's remote antiquity.
10. 1847-49. BOUCHER DE PERTHES, *Antiquités Celtiques et Antédiluviennes*, 2 vols. Discovered flint implements in tertiary strata in alluvial gravel of the Somme.
11. 1854. RIGOLLOT of Amiens made similar discoveries in the region of St. Acheul.
12. 1859. FALCONER and JOSEPH PRESTWICH acknowledged the authenticity of BOUCHER DE PERTHES' discoveries, thus establishing the high antiquity of man.

Notes on the illustrations

Our second plate is plate XXXVI of vol. 2 of P. C. SCHMERLING: *Recherches sur les ossements fossiles découverts dans les cavernes de la province de Liége* (2 vols., and two atlases, 34 + 40 plates, Liége, 1833-34). The following explanation of plate XXXVI is translated from SCHMERLING's book (vol. 2, 177-9):



PHILIPPE CHARLES SCHMERLING
1791-1836



P. C. SCHMERLING : Recherches sur les ossements fossiles, 1833
Vol. 2 pl. XXXVI

Isis, XXIII, pl. 6 P. SHORR

Figure 9 represents a triangular shaped bone cut from a long bone. At its base there is an opening obliquely pierced, uneven at the edges and roundish. It could not have served as a passage for an artery or nerve; it is an opening evidently made by man. This was found among the teeth of a rhinoceros in the cave of Chokier.

Figure 7 represents a bone implement found in the cave of Engis. This bone was cut to a point. One can clearly see there the cut made by a sharp edged instrument. No animal has a similar bone in its skeleton. Hence SCHMERLING concluded it must have served as an implement in primitive industry. It has the shape of a needle.

Figure 10. These flints are of a variable length and size. They are so regular in shape that they cannot possibly be confused with the flints found in the chalk region. Hence the conclusion that they must have been cut by the hand of man and were probably used in making knives or arrows.

SCHMERLING's portrait I found inserted in the inside cover of the atlas, no date being given. The figures reproduced in our text are taken from BOUCHER DE PERTHES : *Antiquités celtiques et antédiluviennes* (3 vols., Paris, 1847-64). Volume 2 contains 26 pl. including 500 figs., this is pl. 6.

Notes and Correspondence

Isis. Duties and Responsibilities of its associate editors.

1. To give advice to the Editor, especially with regard to their own field of study, e.g., as to whether a certain paper is sound and scholarly and deserves to be published in *Isis* or not.

2. Occasionally to review for *Isis* an outstanding work or group of works which is at one and the same time within their own field of study and within the field of *Isis*.

3. When the Editor dies or resigns to help in selecting a new Editor and to make sure that the standards of scholarship of *Isis* remain as high as possible. There might be a tendency among members of the HSS. to popularize *Isis* and make it pay; such a tendency should be resisted if it jeopardized the scientific value of our journal, as it probably would.

With regard to this third responsibility which is possibly the main one, but I hope a distant one, I must say that the future of *Isis* is still uncertain. *Isis* is the property of the Editor, who is anxious to insure its continuation but only if its scholarly character can be guaranteed.

I am willing to bequeath my rights to the HSS as soon as the proper guarantees can be provided. The number of professional historians of science is so small that the HSS is not and cannot be a professional society or a society of experts in the way that the Mathematical and Astronomical Societies are. Most members are of necessity amateurs, and the executive committee itself may consist largely of amateurs. Hence it is clear that the ownership of *Isis* cannot be transmitted to the HSS without special safeguards. I hope these matters may soon be adjusted, but in any case the responsibility of continuing the traditions of *Isis* and of improving them, would rest primarily upon the board of associate editors and that board should preserve a large amount of independence with regard to the HSS.

The relationship between the HSS and *Isis* was officially defined in the " Articles of agreement " printed in *Isis* 16, 125, 1931, at the request of the Council of the Society.

Nov. 24, 1934. GEORGE SARTON.

The study and teaching of the history of science and of medicine in Rumania.—Great efforts have been made for many years in Rumania to promote our studies. The main center is the university of Cluj. (Germ., Klausenburg ; Hung., Koloszvár) in Transylvania. An institute and museum for the history of medicine and pharmacy was established in that university, the first director being the parasitologist JULES GUIART of Lyon, the present director, Prof. VALERIU LUCIAN BOLOGA. A great many of the latter's valuable publications have been registered in *Isis*, especially in our forty second critical bibliography. More bibliographical information relative to him may be found in the *Memoriu de titluri si lucrari* published in Cluj 1926 and from time to time afterwards, and in his annual reports included in the yearbooks of the university. A more elaborate account by Professor BOLOGA appeared in *Archeion*, vol. 9, 517-20, 1928.

The history of mathematics and mathematical sciences is well taken care of by Professor PETER SERGESCU, whose name has very often appeared in *Isis*. At the Portuguese congress in October 1934, it was my privilege to hear him explain the work being done in his country on such a large scale and with so much enthusiasm (in spite of very limited financial resources).

The success of our studies in Rumania must be ascribed partly to a wise administration of the educational system, but to a large extent to the availability of two men of unusual distinction and energy, Prof. P. SERGESCU and Prof. V. L. BOLOGA.

GEORGE SARTON.

Lingua belgica (a footnote to SARTON's STEVIN, *Isis* 21, 257).—" Vous vous étonnez de l'emploi du mot belga (ou belgicus) dans le sens de Pays-Bas (appartenant aux P. B.) : au XVI^e^ siècle le terme Belgium a très couramment le sens de : *Pays Bas, en général*, comprenant la Néerlande et la Belgique actuelles ; c'est la traduction (adaptation) du latin Belgium (ou Gallia Belgica) de CÉSAR, p. ex. — qui s'étendit progressivement à tout le territoire au delà des Bouches du Rhin habité par les Bataves, les Francs, Frisons etc. *Lingua belgica* signifie toujours langue *propre* à ce territoire : hollandais ou flamand — tous dialectes bas-allemands ou plutôt *bas-germaniques* : lorsqu'un groupe d'émigrants hollando-belges alla s'établir en Amérique, le pays occupé par eux fut appelé *Belgium novum* ou *Nieuw-Nederland* dont *Nieuw-Amsterdam* devint la capitale. Lors de la séparation des P. B. méridionaux (ou " catholiques " ou " royaux ") d'avec les P. B. septentr. ou confédérés (Provinces Unies, Néerlande) les premiers furent désignés couramment sous le nom de *Belgium cathol.* ou *regium* (Belgica cath. ou reg.) et les autres *Belgium*

fœderatum : voyez p. ex. les grands atlas publiés au XVII^e siècle, BLAEU, J. JANSSONE etc., etc. ; cette pratique se continua jusqu'à la fin de l'ancien régime."

(*Bibliothèque Royale, Bruxelles*) ALBERT TIBERGHIEN.

"Poudres des Jésuites" and ginseng.—The recent number of *Isis* (no. 63) contains an unusual richesse of book reviews. In the one on P. FOURNIER, Professor KOFOID uses the terms "poudre des Jésuites" and "quinine" synonymously (p. 304). The latter was not discovered until long after the introduction of the powder. Jesuits powder is nothing more or less than powdered cinchona bark. The mistake is a common one.

As to LAFITAU's discovery of ginseng in the woods of Canada, the reviewer seems to be unaware of LAFITAU's monograph dedicated to the Prince of Orleans. Years ago I began a study of the Jesuit and other accounts of ginseng, both in Manchuria and this continent, and collected a stack of material. Unfortunately, I have not found the time to complete these researches.

(*Madison, Wisc.*) EDWARD KREMERS.

Personalia.—At the annual meeting of the American Association for the Advancement of Science (AAAS) recently held at Pittsburgh (end of Dec. 1934), Dr. GEORGE SARTON, Associate of the Carnegie Institution of Washington, editor of *Isis*, was elected a Vice-President and Chairman of the section on historical and philological sciences. He will take charge of the meetings of that section to be held in June 1935 at Minneapolis, and in December 1935 at Saint Louis.

Reviews

Bettina Strauss.—*Das Giftbuch* des ŚĀNĀQ. Eine literatur-geschichtliche Untersuchung. 64 p., 66 p. in Arabic. (*Qellen und Studien zur Geschichte der Naturwissenschaften und der Medizin*, 4. H. 2). Berlin, SPRINGER, 1934 (RM. 15).

This is an important contribution to our knowledge of the transmission of learning from India to Islām. We are given an edition of the Arabic text of the Kitāb al-sumūn ascribed to SHĀNĀQ the Hindu, with a German translation and an elaborate study of its sources and development (27 p.). The ultimate origin is proved by a series of parallel quotations culled from the *Arthaśāstra* of KAUṬILYA or CĀṆAKYA, CANDRAGUPTA's unscrupulous minister (fl. c. 320 B.C., *Intr.* 1, 147) and a later work of the same kind the *Nītisāra* of KĀMANDAKI and also from medical writers, SUŚRUTA and CARAKA (*Intr.* 1, 284).

The Sanskrit book of poisons was translated into, or explained (*fassara*) in Persian by MANKAH (or better, KANKAH? *Isis* 14, 470), who fl. c. 767 (*Intr.* 1, 530). That Persian version was taken down by ABŪ ḤĀTIM of Balkh and interpreted (*fassara*) by him in Arabic for the Barmakid YAḤYĀ IBN KHĀLID (d. 805). Finally the text was rewritten or edited in Arabic by AL-'ABBĀS IBN SA'ĪD AL-JAUHARĪ, in the time of AL-MA'MŪN: We may ascribe the Arabic text to him, and the more so because to the Hindu core were added Greek elements (pseudo-DIOSCORIDES) and Arabic ones (JĀBIR). Miss STRAUSS concludes :

" Der erste — indische — Teil unserer Schrift muss als ein Werk der Übersetzungsliteratur angesehen werden. Ob der Inder MANKAH, den wir als Übersetzer nicht anzweifeln können, ein solches Buch des SHĀNĀQ schon im Indischen vorfand, oder ob er es erst in dieser Form für die Übersetzung anfertigte, lässt sich nicht mehr ausmachen. Die grössere Interpolation griechischer Herkunft — die Beschreibung der verschiedenen Giftarten und die Herstellung der Gifte — sowie auch einige Glossen, sind dem Bearbeiter zuzuschreiben, der einen zweiten — griechischen — Teil der Schrift angefügt hat. Dieser Teil ist dem indischen Charakter der Schrift in einer ganz äusserlichen Weise angepasst, indem gelegentlich indische Drogen angeführt werden. Entsprechend der Nachricht in der Einleitung muss als letzter Bearbeiter AL-'ABBĀS IBN SA'ĪD AL-JAUHARĪ angesehen werden. Dieser hat auf Grund seiner Kenntnis der griechischen Toxikologie die Rezepte zur Giftherstellung dem Fürstenspiegel-Giftbuch angefügt."

The Arabic text covers 64 p. plus 2 p. of errata, the German translation 34 p. The omission of a glossary is inexcusable, and the more so because the price of this valuable but very small book is absurdly high. (It costs much more than a whole volume of *Isis* to members of the HSS !) At that price we might have been given at least something complete and self-sufficient, and the edition of a technical text without glossary is essentially incomplete. GEORGE SARTON.

al-Bīrūnī.—*The book of instruction in the elements of the art of astrology by* ABŪ'L-RAYḤĀN MUḤAMMAD IBN AḤMAD AL-BĪRŪNĪ. Written in Ghaznah, 1029 A.D. Reproduced from Brit. Mus. MS. Or. 8349. The translation facing the text by R. RAMSAY WRIGHT XVIII+ 674 p. London, LUZAC, 1934 (Edition limited to 100 copies).

It is a great pity that the author of this translation to which he had devoted so many years of fond and pleasant labor, did not live quite long enough to see it published. He had time however to read all of the proofs, except a part of the preface, before his death on Sept. 5, 1933. In this review I shall first introduce him, then analyze AL-BĪRŪNĪ's *Tafhīm*, and finally speak of the present edition and translation.

ROBERT RAMSAY WRIGHT was born in Alloa, Scotland, on Sept. 23, 1852, the son of the Rev. JOHN WRIGHT and CHRISTIAN RAMSAY. He studied in Alloa Academy, then at the High School and University of Edinburgh. His professional life was almost entirely spent at the University of Toronto, where he was professor of natural history, later of biology, and for a time vice-president. He wrote a number of papers on zoology, comparative anatomy, biology, fisheries, etc. After his retirement as emeritus he settled in Oxford.

Dr. J. F. FULTON of New Haven, Conn., wrote to me " Shortly before his death RAMSAY WRIGHT told me that he was LISTER's first dresser at Edinburgh, that must have been about 1870." An obituary appeared in the *Times* of Sept. 7, 1933, but does not say anything about his oriental studies, the origin and development of which are still unknown to me.

It is hardly necessary to insist upon the importance of AL-BĪRŪNĪ's personality, for it has been impressed repeatedly upon the readers of this journal as upon the readers of my *Introduction* (chiefly 1, 707-09). Though I called the first half of the eleventh century " the time of AL-BĪRŪNĪ," and paid full homage to him, if I had to rewrite that vol. 1 now the section devoted to him would be considerably longer. For one thing new light has been thrown on him by my friend MAX MEYERHOF (1932, *Isis* 20, 451-4), and I am more and more convinced that he was one of the greatest and most original scientists of Islam and of the Middle Ages.

The *Tafhīm* had not been edited before, and was only known to western scholars through the extracts translated by the late EILHARD WIEDEMANN (see my *Introd.* I, 708). According to AL-BĪRŪNĪ's own statement in his autobibliography he wrote it in 420 (1029). He wrote it in Ghazna (Afghānistān) which was then one of the intellectual centers of the world. It is remarkable that it was dedicated to a woman, one RAYḤĀNAH of Khwārizm, daughter of AL-ḤASAN, but we have other evidence (e.g., in the Arabian Nights) proving that some Muslim women were not only well educated but very learned.

The scope of the *Tafhīm* is clearly indicated in AL-BĪRŪNĪ's foreword :

" The comprehension of the structure of the universe, and of the nature of the form of the heavens and the earth and all that is between them, attained by rehearsing information received, is extremely advantageous in the art of astrology, because thereby the listener acquires practice, he becomes accustomed to the terms current among astrologers, the apprehension of their meanings is facilitated, so that when he again meets them in his study of the various problems and demonstrations he brings to these a mind freed from having to deal with difficulties from both sides (the problem and its terms). It is on this account that I have prepared, at her request, an aide-mémoire for RAYḤĀNAH (the Khwārizmian) daughter of AL-ḤASAN, in the form of question and answer, which is not only elegant, but facilitates the formation of concepts. I have begun with geometry and proceeded to arithmetic and the science of numbers, then to the structure of the universe, and finally to judicial astrology, for no one is worthy of the style and title of astrologer, who is not thoroughly conversant with these four sciences."

The *Tafhīm* is divided as follows : Geometry (1-71) (1), arithmetic (72-119), astronomy (120-235), geography (236-41), astronomy again (242-67), chronology (269-323), astrolabe (324-46), astrology (347-530) : signs, planets, division of the signs, houses, part of fortune, judicial astronomy.

It is difficult to know whether the *Tafhīm* was originally written in Arabic or Persian: There are early MSS. in both languages, and it has been suggested by E. G. BROWNE that it was produced simultaneously in both languages. We do not know. WRIGHT suggests that the Persian versions was perhaps made for RAYḤĀNAH who was a Persian woman, but that is not very plausible, for if RAYḤĀNAH was as learned as we must assume her to have been, she knew Arabic which was the beginning of all learning, whether sacred or profane. Arabic was the learned language or Persia in the same sense that Latin was the learned language of sixteenth or seventeenth century Europe. It was easier for a French doctor of that time to read a scientific book in Latin than to read it in French, because he was more familiar with the Latin terminology than with

(1) The numbers refer to paragraphs; I quote them in order to give some idea of the length of each section.

the French, and because the Latin terms were more technical and definite than the French. In the same way it was easier for an educated Persian to read scientific books in Arabic than in his own language.

Whatever the original language of the *Tafhīm* may have been, there are MSS. in both languages; the earliest Arabic MS. (Berlin) dating from 1237 A.D., the earliest Persian from 1270 A.D. (Paris) and 1286 (London). Dr. WRIGHT made his first translation on the London Persian MS., but later checked it upon the Arabic text. The present edition contains a photographic copy of an Arabic MS., not the earliest but a later one selected for its legibility (a few gaps being filled by means of two other MSS.), and on opposite pages a photographic copy of the typescrit of the English translation and notes. That disposition is very convenient and we cannot be too thankful to the author for having thus placed within easy reach of every scholar one of the greatest scientific books of the eleventh century. The index might have been more developed, but such as it is, we are very glad to have it.

Let us hope that the availability of this text even to non-Arabists will stimulate further studies from the purely scientific point of view. I have two copies of WRIGHT's rare edition and will gladly give one to any competent scholar who would undertake to analyze its contents from our point of view, for *Isis*.

The next desideratum is a similar edition with translation of *Al-qānūn al-Mas'ūdī* for which some preparatory work was already done by the late CARL SCHOY (*Isis* 5, 51-74; 7, 536; 10, 495-7), but the edition of AL-BĪRŪNĪ's *Qānūn* will be even more difficult than that of his *Tafhīm*.

GEORGE SARTON.

Isak Collijn.—*Acta et processus canonizacionis beate* BIRGITTE. Samlingar utgivna av Svenska Fornskriftsällskapet. Andra serien. Latinska skrifter, Band 1. LV+692 p., quarto. Uppsala, ALMQVIST & WIKSELLS Boktryckeri, 1924-31.

Acta et processus canonizationis Sanctae BIRGITTAE. Codex holmiensis A 14. Med inledning av ISAK COLLIJN (avec une traduction française). Handskrifter från Sveriges medeltid utgivna i ljustryck, I. Stockholm, FRITZES Kungl. hovbokhandel, 1920.

Isak Collijn.—*Iconographia birgittina typographica.* BIRGITTA *och* KATHERINA i medeltida bildtryck. 2 parts., quarto. Stockholm, ALMQUIST & WIKSELLS, 1915-18.

Isak Collijn.—*Birgittinska gestalter.* Forskningar i italienska arkiv och bibliotek. XII+134 p., 5 pl. Stockholm, MICHAELISGILLET, 1929.

William Patterson Cumming.—*The revelations of Saint* BIRGITTA.

Edited from the fifteenth century MS. in the Garrett collection in the Library of Princeton University. XL+135 p. (Early English Text Society). London 1929.

Saint BRIDGET or better BIRGITTA (1303-73) is so great a personality that we shall be obliged to include her in our survey of fourteenth century science, even as her contemporary CATERINA of Siena. BIRGITTA was born in Sweden; she was educated and spent the largest part of her life in her native country, but about the middle of the century she went to Rome and remained there until her death. In other words, her origin and formation are purely Swedish (except insofar as her religion brought her into touch with the Latin world), but the center of her activities was Rome. There are three places in Rome which witness for her and are especially sacred to Swedish pilgrims. Firstly San Lorenzo in Damaso, close to which she lived soon after her arrival in 1347; secondly San Lorenzo in Panisperna, where she visited the Poor Clares and begged for them; thirdly Santa Brigida near the Palazzo Farnese, which occupies the site of the house where she died on July 23, 1373. According to her request her body was taken to the Poor Clares where it was buried until its translation to Vadstena in the following year. The empty sarcophagus can still be seen in San Lorenzo in Panisperna.

The critical edition of the acts of her canonization include: *acta*, *attestaciones*, *summarium processus*, *miracula aliquot* 1387-90, *notabile qualiter et quomodo miracula sanctorum debeant examinari*. The process of canonization begun in 1378 ended in 1380, and BIRGITTA was officially canonized in 1391. Soon after her death GALHARDUS, bishop of Spoleto, had already sent, on Dec. 14, 1373, a report to the pope, including biographical accounts given by BIRGITTA's two confessors both called PETRUS OLAVI (PETER OLAFSSON), the one prior of Alvastra, the other magister of Skänninge. These documents constitute the earliest and fundamental source for her biography, and we are glad to have here a critical edition of them (p. 613-41). I may add here that the earliest English life of the saint was relatively early, for it was composed by THOMAS GASCOIGNE (1403-58). This was edited by JOHN HENRY BLUNT in *The Myroure of oure Ladye* (Early English Text Society, London 1873, p. XLVII-LIX).

The indices have been compiled with unusual care and will be valuable to students of the fourteenth century, inasmuch as brief biographical data are given for all the persons named (the index of persons fills 64 columns). The elaborate introduction, being written in Swedish, is unfortunately unavailable to the majority of scholars, who will have to restrict themselves to the Latin texts.

It will suffice to say a few words of each of the following publications.

COLLIJN's edition of the *Acta canonizationis* is naturally based upon all the MSS., three in number. Two of these MSS (Stockholm and Vatican) date from the end of the fourteenth century, the third one (British Museum), from the middle of the fifteenth. The Stockholm MS, formerly in Vadstena, being by far the most important, it was really worthwhile to make a facsimile edition of it which was published in 1920.

The *Iconographia birgittina* is a collection of incunabula prints relative to BIRGITTA and to her daughter the Blessed KATHERINA, who lived in Rome until her mother's death and died in Vadstena in 1381.

The " Brigittine figures " is a collection of studies centered around the Swedish Saint. The most interesting to our readers is the fifth one dealing with her miracles and the physicians of her time in Rome.

The last item was mentioned for the sake of illustrating American interest in the matter.

It was my privilege in July 1934 to meet the main Swedish student of BIRGITTA, Dr. ISAK COLLIJN, the learned and genial director of the Swedish libraries in general and of the Stockholm library in particular, and we had very pleasant interviews in his library and also in his cosy summer house at Toivo in the incomparable Stockholm archipelago. Later in order to continue my Brigittine education I pilgrimed to Vadstena, so beautifully located on Lake Vettern. The Blåkyrka (Blue church) is very impressive indeed. How I wish I could have roamed longer in that idyllic and moving neighborhood! Saint BIRGITTA was by far the most important personality of mediaeval Sweden; it is rather paradoxical that her center of influence was in Rome, but the Vadstena nunnery, planned by herself and consecrated soon after her death, was for a long time one of the main intellectual centers of Scandinavia.

GEORGE SARTON.

Hubert Pruckner.—*Studien zu den astrologischen Schriften des* HEINRICH VON LANGENSTEIN. XIV+286 p. (*Studien der Bibliothek Warburg*). Leipzig, TEUBNER, 1933.

This is a very important contribution to the study of mediaeval astrology. It is largely devoted to HEINRICH VON LANGENSTEIN (1325-97), *dictus* HENRICUS DE HASSIA (Hessen), one of the most interesting figures of the fourteenth century not simply because of his decided opposition to astrology but also because he was one of the first mathematical teachers of Germany. The author gives us critical editions of two fundamental texts by this HEINRICH VON LANGENSTEIN: the *Quaestio de cometa* (p. 89-138) written in 1368-69 apropos of the comet of 1368, and the *Tractatus contra astrologos coniunctionistas de eventibus futurorum* (p. 139-206), written in 1373 apropos of the planetary conjunction of that year

This is followed by two *pronosticationes* relative to the comet of 1368, the first anonymous (Parisian), the second by HERMANNUS DE PRZEWORSKO, a Polish writer otherwise unknown ; three other *pronosticationes* relative to the famous planetary conjunction of 1345, composed by three French mathematicians : GEOFFROY DE MEAUX, FIRMIN DE BELLEVAL and JEAN DE MEURS, and finally NICHOLAS ORESME's *Tractatus contra astrologos* (p. 227-45). This valuable collection of texts seems to have been edited with meticulous care and it is elaborately indexed,—hence the future historian of fourteenth century astrology will have his materials provided for him (as far as these typical texts are concerned) in the most convenient manner.

The introduction (88 p.) contains the usual description and analysis of the MSS., and a general discussion of the LANGENSTEIN's treatises and the contemporary prognostications, but no biographical information, this being reserved for an ulterior publication.

The editor concludes (p. 86-8) :

" HEINRICH VON LANGENSTEIN war sich keineswegs darüber im Unklaren, dass die Astrologie den grössten Teil ihres Erfolges der Tatsache zu verdanken hatte, dass sie als Wissenschaft auftrat und als solche von den Zeitgenossen gewertet wurde. Wohl erfuhr sie auch offenbare Begünstigung von Seiten der Grossen und Mächtigen der Erde, und HEINRICH steht nicht an, auch darauf als Grund für das siegreiche Vordringen der astrologischen Spekulation hinzuweisen. Indes glaubt er gerade dadurch, dass er den wissenschaftlichen Charakter der Astrologie bestreitet, nicht nur die gelehrten Kreise der Universität, sondern vor allem die Fürsten zu einer ablehnenden Stellungnahme gegen diese Wissenschaft bestimmen zu können. Die Mittel aber, diesen Kampf gegen die Astrologie aufzunehmen und den Versuch zu wagen, ihr Ansehen als Wissenschaft zu erschüttern, boten ihm die naturphilosophischen Anschauungen der Scholastik..."

" Um die Grundanschauungen der Astrologie als haltlos zu erweisen, unternimmt es LANGENSTEIN, das Auftauchen und das Verlöschen von Himmelszeichen und das Zustandekommen von Konjunktionen auf rein natürliche Ursachen zurückzuführen und damit den Kometenerscheinungen und Planetenkonstellationen den Nimbus des Geheimnisvollen zu nehmen. Eine solche Beweisführung erscheint als die geeignete Basis, von der aus weitere Angriffe gegen die astrologische Gedankenwelt zu richten, insbesondere die herrschenden Ansichten der Astrologen von den Einwirkungen der Himmelszeichen auf die sublunarische Welt zu bekämpfen sind.

Es ist nun aber doch bezeichnend, dass selbst LANGENSTEIN den Einfluss der *cause superiores* auf die untere Welt unter ganz bestimmten Voraussetzungen zugibt. Seine diesbezüglichen Ausführungen sind zwar gewunden genug, aber sie lassen doch erkennen, dass HEINRICH ganz im Sinne THOMAS' VON AQUINO eine Beeinflussung der *vires pure naturaliter agentes* durch die *cause superiores* als möglich annimmt, falls die Disposition der unteren Welt dafür günstig ist. Ja, er glaubt sogar, dass bei umfassender Kenntnis der *habitudines causales* und der *dispositio inferior* in naher Zukunft eintretende Wirkungen vorausgesagt werden könnten. Die herrschende Astrologie sei jedoch ganz anders eingestellt und deshalb auf Abwege geraten.

Indes macht LANGENSTEIN in seinen Ausführungen gegen die Astrologen nicht den geringsten Unterschied zwischen der ernsten, wissenschaftlichen Astrologie seiner Zeit und ihrer ungleichen Schwester, der judikarischen Astrologie, die aus dem Ansehen der ersteren für ihre Zwecke Nutzen zog. Für ihn ist der Gegner die herrschende Astrologie schlechtweg. Aus dieser Einstellung heraus werden die oft recht haltlosen Behauptungen der Pronostikationsliteratur ebenso eingehend wissenschaftlich zu widerlegen versucht, wie die Gedankengänge des PTOLOMAEUS und der grossen arabischen Astrologen.

Dass HEINRICH bei der Abfassung seiner Abhandlungen ausser den *Libri meteorologicorum* und dem *Liber de caelo et mundo* des ARISTOTELES und hierüber vorhandenen Kommentaren auch mittelalterliche Traktate zu Rate gezogen und benützt hat, dafür finden sich in seinen Schriften nur vereinzelte Anhaltspunkte. Leider ist nun aber auch unsere Kenntnis der naturphilosophischen Schriften jener Zeit noch eine zu dürftige, um hier ein einigermassen sicheres Urteil darüber zu ermöglichen, wie weit die Abhängigkeit LANGENSTEINS in dieser Beziehung geht.

Mag dem indes sein, wie ihm wolle, eines ist sicher: Dass die beiden Traktate LANGENSTEINS uns ein aufschlussreiches Bild über die Stellungnahme führender Kreise der scholastischen Wissenschaft an der Pariser Universität um 1370 zum Problem 'Astrologie' vermitteln. Insofern bilden sie ein nicht unwichtiges Dokument zur Geistesgeschichte des 14. Jahrhunderts."

This work is a credit to the Bibliothek Warburg, which has already produced so many eminent contributions to the study of ancient traditions during the Middel Ages and the Renaissance. That great institution of learning and its treasures have recently been moved from Hamburg to London. They are now established in very spacious rooms in Thames House, Millbank, S.W.1. My every good wish to them.

GEORGE SARTON.

William van Wyck.—*The Sinister Shepherd*: A Translation of GIROLAMO FRACASTORO's *Syphilidis sive de Morbo Gallico Libri Tres*. XXIV+88 p. The Primavera Press, Los Angeles, 1934. (Price $4.50)

Although one of the most famous of medical poems, FRACASTORO's *Syphilis* has not been easily available in English translation. NAHUM TATES' 18th century edition is a relatively rare book, although reprinted in the *Dryden Miscellany* and elsewhere. (1) Therefore WILLIAM VAN WYCK's modern translation of FRACASTORO's hexameters is a valuable addition to medical literature. Mr. VAN WYCK makes no pretense of closely following his original, in fact he emphasizes that it is not a literal translation, as he was "ever striving to show in the modern English version the values of FRACASTORO as a writer of belles lettres." The result is that in some passages the meaning is not quite the same as in the original, and this is particularly true of the expression of certain scientific ideas of the times. However in the descriptive passages he

(1) See Dr. JOHN FULTON's forthcoming bibliography of FRACASTORO's *Syphilis*.

has captured the spirit of the original, with its vivid pictures of the ravages of this dread disease.

The modern version follows the original arrangement, division into three books. Book I tells of the causes and symptoms of the disease, in which FRACASTORO devotes a great deal of space to the astrological factors. In this book appears the realistic portrayal of the effect on a handsome young man of fulminating syphilis. Book II deals with regime and treatment, with an allegorical tale of the discovery of the use of mercury. Book III is probably the most interesting, as here is the story of the disease in the New World, told in the romantic style then so popular. It is from one of the characters of this part, the shepherd boy *Syphilus*, that the disease derives its present name. The aim of this story is to tell of the value of *guaiac*, which had such a vogue in the 16th century.

Mr. VAN WYCK's edition is well annotated, and has some interesting illustrations. FRACASTORO's poem is an important medical document, as an illustration of the medical thought of the Renaissance, but it also can stand on its literary merits. S. V. LARKEY.

J. H. Thomas.—*Town Government in the Sixteenth Century*. 188 p., 4 pl. figs. London, GEORGE ALLEN & UNWIN Ltd. 1933. (Price 8s. 6d.).

This very valuable survey of municipal government in 16th century England, based chiefly on the study of the records of some twelve provincial towns, has many chapters that are of interest to the medical historian and to those concerned with the history of public health activities. For Mr. THOMAS' work shows the important place given to such problems by the town authorities, and, in the light of his findings, many of our present views as to the bad sanitary conditions in Elizabethan times must at least be modified. It would seem that those responsible in the towns devoted their greatest effort to bettering the sanitary conditions and the health of their towns.

The author devotes separate chapters to various phases of the problem, as streets and street cleaning, water supply, food regulations, especially ale, the poor and unemployment, and the control of disease. In all of these he tells of the laws governing such activities, and, from the records, he has found out how these laws were enforced. Most of their measures were sound and led to general improvement.

While some aspects have been studied separately, THOMAS' book is important in that it gives the general picture and relates these various activities to each other. Thus his work on provisions for the Poor supplements the excellent study of the Poor Law by Lord PASSFIELD (SIDNEY WEBB) and BEATRICE WEBB. Thomas characterizes the efforts

of the 16th century as follows: "Free education, free medical aid for the poor, relief for the needy, and homes for the aged was the policy of the town rulers. Even if their aims were not fully realized, their effort commands respect."

In his chapters on the control of plague and other diseases he gives many details of the regulations adopted to prevent the spread of disease and to care for those afflicted, recounting how these laws were enforced, how isolation hospitals were built, the cost to the community, and how it was met. He brings up an arresting point in regard to the nature of some of these diseases, whose spread has been attributed to the unwholesome conditions of the towns. He feels that sanitary conditions were not primarily responsible and that in fact these conditions were relatively quite good. Many of these diseases cannot be classed as 'filth' diseases. He says: "If a wider knowledge of town life as revealed by town *Records* refutes the view that towns remained filthy and entirely neglected by ignorant and irresponsible authorities, so must a fuller acquaintance with the little that is known about the origin of the diseases of the 16th century modify the opinion that town conditions caused those diseases." He compares the state of these towns in the 16th century with that in the middle of the 19th century, as revealed in the Royal Commission Survey of 1844-1845, and comes to the conclusion that in almost every respect the towns were cleaner and more healthy in the 16th century than they were in the 19th century. He says: "If some period in town life must be labelled as a time of in-sanitation, then the 19th century should be chosen."

One criticism that might be made of THOMAS' work is that he does not relate the endeavours of the towns to the efforts of the national government, but probably he was wise in this course, as he has done an excellent job in his own field and there is still not enough material to make this more general survey. There should be a complete study of all the phases of public health activity in the most general sense, pure food laws, housing regulations, etc., as well as the specific problems of disease. A continuation of this history in the following periods would give some knowledge of the causes of the eventual breakdown. S. V. LARKEY.

Sir Isaac Newton's ***Mathematical principles of natural philosophy and his System of the world.*** Translated into English by ANDREW MOTTE in 1729. The translations revised, and supplied with an historical and explanatory appendix, by FLORIAN CAJORI. XXXVI+680 p., frontispiece, facs., figs. Berkeley, Cal., University of California Press, 1934 (Price: bound in acid-free half leather $10).

Friends of the late FLORIAN CAJORI (1859-1930), professor of the

history of mathematics in the University of California, knew that he had been preparing for years a new English edition of NEWTON's *Principia*, and that his revision was practically complete at the time of his death. In fact, in ARCHIBALD's study of CAJORI's life and works (*Isis* 17, 384-407, 1932, with portrait) the publication of that revision was announced for the year 1932. However, the final preparation of the MS. and proof-reading by R. T. CRAWFORD took considerably more time than had been foreseen and the book did only appear at the end of last year. Never mind the delay for now we have it and are mightily pleased with it.

The English translation published in 1729 by ANDREW MOTTE, lecturer in geometry at Gresham College, London, has been revised, many obsolete expressions being replaced by modern ones, e.g., " reciprocally in the subduplicate ratio," which would discourage the twentieth century reader, being changed to " inversely as the square root of." Moreover CAJORI had prepared a long series of explanatory and historical notes which are printed at the end of this revision (p. 627-80). Some of these notes are very valuable indeed, for example a propos of ROGER COTES' preface to the second edition of the *Principia* (1713)—which was an elaborate criticism of the Cartesian theory of vortices—CAJORI explains very clearly the history of the protracted struggle between Cartesianism and Newtonianism in England (p. 629-32). The triumph of Newtonianism was neither as easy nor as prompt as one might imagine, even in the land of its birth. The best physical textbook of NEWTON's time was the *Traité de physique* of JACQUES ROHAULT (1620-75), first published in 1671 and available to English students in Latin and English translations. It was still the Cambridge textbook in 1730, three years after NEWTON's death and forty three years after the appearance of the *Principia*. Now ROHAULT was an enthusiastic follower of DESCARTES and his textbook was purely Cartesian. However, SAMUEL CLARKE (1675-1729), the metaphysician of Caius College, who translated ROHAULT's book into Latin (1697), added Newtonian notes to it, and in the successive editions these notes became more and more destructive of the text to which they were appended. Thus Newtonianism was largely diffused in Cambridge and in England by a Cartesian vehicle !

These notes are so interesting and important that the lack of an index to them is deplorable.

The printing of this new English edition is very beautiful in a discreet manner which is very appropriate to the text. This magnificent volume is a credit to the University of California Press, and my only but sharp regret when handling it is that my lamented friend, FLORIAN CAJORI, did not live to see it.

GEORGE SARTON.

DÆDALUS HYPERBOREUS.

Eller

Några Nya

MATHEMATISKA och *PHYSICALISKA*

Försök

Och

Anmerckningar

För åhr 1716:

Som

Welborne Herr Assess. Pålheimer

Och

Andre Wänrike i Sverige

hafwa giordt

Och

Nu tid efter annan til almen nytto lemna.

DÆDALUS en auras carpit, ridetqve superne
Quos sibi Rex Minos struxit in orbe dolos.
Auras *Arte tuâ* sic tu, mi Dædale! carpe,
Atqve dolos ride quos Tibi turba struet,

Försäljes af Bokföraren.

UPSALA,
hos Kongl. Maj:tz och Upsala Academiæ Bokt.
JOHAN. HENR. WERNER 1716.

First journal of the Swedish Academie of Sciences, SWEDENBORG being one of its editors.

Courtesy of Library of Congress and F. E. BRASCH.

Emanuel Swedenborg.—*Opera quaedam aut inedita aut obsoleta de rebus naturalibus.* Nunc edita sub auspiciis Regiae Academiae Scientiarum Suecicae. Holmiae, ex officina Aftonbladet, 3 vols., 1907-11. I. *Geologica et epistolae*, LI+344 p., port., figs., 1907; II. *Cosmologica*, XXXV+373 p., port., figs., 1908; III. *Miscellanea de rebus naturalibus*, XXXVII+328 p., port., figs., 1911.

Emanuelis Swedenborgii *Itineraria.* Editio tertia emendata. Resebeskrifningar af EMANUEL SWEDENBORG under åren 1710-1739. Utgifna af Kungl. Vetenskapsakademien den 19 November 1910. 97 p.

Alfred H. Stroh and **Greta Ekelöf.**—*An abridged chronological list of the works of* EMANUEL SWEDENBORG. Including manuscripts, original editions and translations prior to 1772. 54 p. Uppsala, ALMQVIST & WIKSELLS, 1910.

This edition of SWEDENBORG's scientific works published by the Swedish Academy of sciences should have been reviewed in *Isis* a long time ago. Remembering the proverb: Better late than never, we venture to review it now together with two other Swedenborgian publications which we owe to the Academy's generosity.

I am very glad to have this opportunity of speaking of EMANUEL SWEDENBORG (born in Stockholm 1688, died in London 1772) who was one of the most interesting personalities of that XVIIIth century, so rich in philosophical and scientific genius. SWEDENBORG's personality is especially fascinating to the historian, philosopher and psychologist because of its duality and complexity. Until 1743 he was primarily a technician and scientist; then he received a revelation in London and became a theologian and a mystic, a *prophet*. Thus the scientist SWEDENBORG belongs to the first half of the century; the prophet, to the second half. To better illustrate the contrast let us remember that he died in 1772; in 1777, HALLER and LAMBERT died; in 1778, LINNÉ and VOLTAIRE; in 1782, DANIEL BERNOULLI; in 1783, d'ALEMBERT and EULER; in 1784, DIDEROT; and finally BUFFON in 1788, the very year when the first organized congregation of Swedenborgians met in Great Eastcheap (London). What a galaxy of men and how strange the presence of a true prophet among so many "rationalists"; SWEDENBORG is, I think, the only philosopher, and certainly the only scientist who created a New Church ("The New Jerusalem Church," now spread all over the world.) It is true he did not create it himself; it began to constitute itself only sixteen years after his death, but it was founded entirely upon his writings. SWEDENBORG himself did never break with the Lutheran church, nor that church with him. Though he died in

London, his body was translated to Sweden (in 1908) and was buried in the cathedral of Uppsala, where I visited last summer his simple but beautiful tomb (1).

SWEDENBORG was not simply a scientist, but a very distinguished one, a pioneer in many lines. If he has not received more credit for his many discoveries and anticipations, it is largely because his later prophetic activities provided him with the worst credentials as far as the " hard-boiled " scientific world was concerned. He was one of the founders of the Swedish Academy of Sciences and one of the editors of its first journal, the *Daedalus hyperboreus* (1716-18).

To return to the books so handsomely published under the auspices of the Swedish Academy, they contain not only the scientific writings already published in out of print and rare editions, but also the text of very abundant MSS preserved in the Academy's library. MAX NEUBURGER, the great historian of medicine of Vienna, delivered an address at Hamburg in 1901 wherein he drew attention—with more emphasis and authority than had been done heretofore—to SWEDENBORG's remarkable discoveries and intuitions concerning the functions of the brain, and the localization of motor centres and of psychical phenomena. In the following year he appealed to the Swedish Academy to publish the MSS in its keeping. The Academy was only too willing to do this but the task was considerable and full of difficulties and pitfalls. It was finally accomplished thanks to the devotion of an expert editor, the American ALFRED H. STROH, of a Swedish Maecenas, Prof. GUSTAF RETZIUS and of various Swedenborgian communities.

Vol. 1 includes the geological and palaeontological writings as well as a series of 92 scientific letters of SWEDENBORG and his friends, and an elaborate introduction (33 p.) by ALFRED G. NATHORST " SWEDENBORG as a geologist," of which the final paragraph may be quoted :

" One immediately notices in studying SWEDENBORG's geological writings that an investigating nature of the highest rank is in question, which on a solid foundation and with sharp powers of observation noticed everything, even what was apparently insignificant, in order to draw conclusions from it, and which when possible endeavored to control the correctness of the same by experiment. The wealth of observations which he collected from various parts of Europe is astonishing, and he did this at a comparatively early age. Even if he did not free himself from the incorrect view that NOAH's flood extended over the whole earth, he nevertheless saw that many phenomena which testified to a higher water-level in former times did not arise from the so-called universal flood, and this in itself involves a step forward in the direction of a complete liberation from the dogma which had prevailed up to that time, and which had exercised so restricting an influence on the development of geology. The condition of

(1) The remains of RUDBECK and LINNÉ rest in the same sanctuary.

chemistry at this time was a great disadvantage to him, for he could not make use of it to arrive at a final solution of various questions, even when he was on the right road. But the many-sidedness, to which his geological works bear witness, is truly remarkable; nearly all questions of great significance for the geology of that time are touched upon by him, and still these works are but the minor portion of his whole scientific activity, which in many respects was far ahead of the times. For he was also a mathematician, astronomer, cosmologist, physicist, mechanic, chemist, anatomist and physiologist. What ANDERS RETZIUS said concerning SWEDENBORG's *Regnum animale*, that it was a ' wonder-book', in which are found ' ideas belonging to the most recent times, a compass, induction and tendency, which can only be compared to that of ARISTOTLE', seems after the experience now attained to be capable of application to practically the whole of his scientific activity. His was a mighty spirit, of which our country has the more reason to be proud, because it was united with a personality in every respect noble and unassuming."

Vol. 2, *Cosmologica*, contains his most ambitious work, the *Principia rerum naturalium ab experimentis et geometria sive ex posteriori et priori educata*, which formed the first volume of his *Opera philosophica et mineralia*, printed at Dresden in 1734. SWEDENBORG had probably devoted to its composition a large part of the period 1722-34. To this text are added notes by the editor (5 p.) and an introductory essay by SVANTE ARRHENIUS (13 p.).

Vol. III, *Miscellanea*, contains the *Prodromus principiorum rerum naturalium sive novorum tentaminum chymiam et physicam experimentalem geometrice explicandi* (Amsterdam 1721); *Nova observata et inventa circa ferrum et ignem et praecipue circa naturam ignis elementarem, una cum nova camini inventione* (Amsterdam 1721); *Methodus nova inveniendi longitudines locorum terra marique ope lunae* (Amsterdam 1721); *Artificia nova mechanica receptacula navalia et aggeres aquaticos contruendi*; *De causis rerum* (in Swedish); *Philosophia corpuscularis in compendio*, and similar treatises bearing Swedish titles; together with an essay on " the sources of SWEDENBORG's early philosophy of nature (23 p.) by the editor, ALFRED H. STROH. That essay deals mainly with SWEDENBORG's relationship to DESCARTES, NEWTON and CHRISTOPHER POLHEM (" the Swedish ARCHIMEDES"), and is a valuable contribution to the study of Cartesianism in Uppsala, from 1663 to 1710 when the Royal Society of Sciences was founded (see also p. 321-8). It may be noted that SWEDENBORG had already formulated the nebular hypothesis in 1734, i.e., twenty one years before KANT.

" If we examine SWEDENBORG's earliest works in their chronological order we find that the three component parts of his early philosophy of nature,namely, (1) the theory of vortices, (2) the origin of the earth and planets, and (3) the constitution of matter out of grades of particles,—that these three streams of thought follow one another during the second decade of the eighteenth century. It will be observed that their order indicates how SWEDENBORG passed from more

general to more specific questions, from the universe to the particles of which it is composed, and, probably under the guidance of that ancient doctrine that in the microcosm we see the macrocosm, and vice versa, he was led to formulate his early philosophy in such a way as to accept the same laws as governing the least parts of nature which are operative in the grand universe. SWEDENBORG accepted the theory of vortices without question, but applied it successively in two new ways, (1) to the origin and motions of the planets, and (2) to the origin and motions of the grades of ' particles ' in nature. The first application is recorded in the three little Swedish works on the earth and planets published in this volume, and in the three Latin *Principia*. The second application is first found in the ' bullular hypothesis ' of the *Prodromus* and *Miscellanea observata*, and later, in greatly extended form, in the second and third *Principia* and in other works written after 1730 " (p. 325).

The two other publications need not detain us as long. SWEDENBORG's itineraries from 1710 to 1739 are naturally of great biographical interest. The years 1710-33 fill only 2 p., in Swedish; p. 5-62, in Latin, are devoted to the years 1733-34; p. 63-96, in Swedish again, to the years 1736-39.

The chronological list of his writings is useful indeed, though for most purposes the *Bibliography of the works of* EMANUEL SWEDENBORG *original and translated* by the Rev. JAMES HYDE, published by the Swedenborg Society in London 1906 (XVIII+743 p. quarto, 3500 items !) will be even more valuable.

It is a pity that the three volumes of *Opera scientifica* published by the Swedish Academy have not been indexed, for it must be admitted that SWEDENBORG's writings have become almost unreadable, because of their prolixity and of their scholastic tendencies. Yet one would often wish to know his thought on this or that topic and to find rapidly the relevant text. It is possible that this is made possible (in part at least) by the SWEDENBORG *Concordance*, compiled by the Rev. JOHN FAULKNER POTTS (6 enormous vols., London 1888-1902), but I have no means of judging as that work is not available to me. The scientific analysis published by the late FRANK W. VERY in 1927 (*Isis*, 23, 520) is quite insufficient.

To complete this Swedenborgian introduction, the richest collection of materials is still RUDOLPH LEONHARD TAFEL : *Documents concerning the life and character of* E. SWEDENBORG (2 vols. in 3, Swedenborg Society, 1875-77). Section VII of vol. 1 (p. 553-97) deals with his scientific views. Yet the standard book on SWEDENBORG remains to be written and it will not be what it should be unless it is written by a historian of science, very critically, yet with sufficient sympathy with mystical and prophetic tendencies. Such a book should be eventually written, for SWEDENBORG is undoubtedly one of the greatest figures of the eighteenth century. It is very remarkable that a country like Sweden, relatively small and very remote, should have produced at about the same

time two such giants as LINNÉ and SWEDENBORG, not to speak of a host of other distinguished men. GEORGE SARTON.

P. S. Since writing this review I have had an opportunity of examining the SWEDENBORG concordance mentioned above. Its full title is : *The Swedenborg concordance. A complete work of reference to the theological writings of* EMANUEL SWEDENBORG. Based on the original Latin writings of the author. Compiled, edited, and translated by JOHN FAULKNER POTTS. (6 vols. London, 1888-1902). It is restricted to the theological writings but thanks to it one may be able to find *some* of SWEDENBORG's views on scientific subjects and personalities. For example under the heading POLHEM (V, 242) one finds a series of references to him in the *Diary;* under RUDBECK, only one. LINNAEUS and EULER are not named at all. Under the heading SWEDENBORG (vol. 6, 114-58) we are offered a very long list of all the references to himself in SWEDENBORG's theological writings. One might also consult such headings as astrologer, astronomical, medicine, mathematics, etc. Nevertheless we still need an index to the purely scientific writings as published by the Swedish Academy of sciences. G. S.

Daniel Mornet.—*Les sciences de la nature en France, au XVIII^e^ siècle. Un chapitre de l'histoire des idées.* X+291 p. Paris, COLIN, 1911. —*Les origines intellectuelles de la Révolution française*, 1715-1787. 552 p. Paris, COLIN, 1933 (60 fr.).

Il y a près d'un quart de siècle DANIEL MORNET, qui était alors professeur au lycée Carnot (il est maintenant professeur de littérature française à la Sorbonne) publia un petit livre excellent sur les Sciences naturelles en France au XVIII^e^ siècle. Ce livre parut avant la naissance d'*Isis* et ainsi ne fut pas critiqué comme il le méritait, mais il n'est pas trop tard pour en dire quelques mots aujourd'hui, car il n'a pas encore été dépassé ni remplacé, et conserve toute sa valeur.

Ce n'est pas une histoire des découvertes mais plutôt de la vulgarisation scientifique, non pas une histoire individuelle, mais plutôt sociale, l'histoire de la science qui se fixe et se diffuse. Une telle histoire est le complément nécessaire de l'histoire de la science proprement dite, et l'auteur était bien préparé pour écrire sinon celle-ci du moins celle-là. Comme il le déclarait lui-même :

" Une histoire des sciences ainsi conçue nous excuse de n'être qu'historien et de n'avoir pas pour les sciences, et malgré notre goût pour elles, de compétence technique. L'histoire des découvertes, l'histoire scientifique des sciences ne peut être tentée que par les spécialistes. Mais cette histoire sociale n'a pas les mêmes exigences. Il s'agit pour elle de déterminer surtout les actions et réactions historiques de la science et de la vie. L'étude des méthodes scientifiques ne nous intéresse

que lorsqu'elles deviennent stables et universelles, lorsqu'elles font partie de la pensée moyenne. Elles n'ont plus rien dès lors qui ne soit accessible, si l'on a quelque goût pour l'esprit scientifique et pour sa philosophie." (p. IX).

Ce livre est divisé en trois parties symétriques contenant chacune trois livres. I. La " dépuration " de la science : 1. Le goût pour l'histoire naturelle avant BUFFON ; 2. La lutte contre le merveilleux ; 3. La lutte contre la théologie. II. L'organisation de la science. 1. Les systèmes ; 2. La querelle BUFFON ; 3. L'organisation de l'expérience. III. La diffusion de la science. 1. Le triomphe de l'histoire naturelle ; 2. L'histoire naturelle et l'art de plaire ; 3. Les conséquences du triomphe.

Plan ingénieux que l'auteur sut réaliser avec autant d'érudition que d'élégance. Je le répète, c'est un livre excellent et je voudrais que tous les historiens de la science au XVIII[e] siècle le lussent ; il leur fournirait le fond du tableau sans lequel leurs explications risquent parfois d'être erronées et leur permettrait de mettre celles-ci mieux au point.

M. MORNET fut aussi le secrétaire de cette belle *Revue du dix-huitième siècle* qui fut une des victimes de la guerre. Cinq volumes en ont paru de 1913 à 1918. Ces volumes contiennent beaucoup de bonnes choses du point de vue littéraire et artistique, mais quasiment rien qui puisse intéresser directement l'historien de la science. Ceci prouve bien que la science n'intéresse pas M. MORNET, sinon n'aurait-il pas trouvé en cinq ans des collaborateurs pour parler des œuvres scientifiques, qui furent une des gloires les plus pures de ce grand siècle ?

Mais venons-en au livre qui est l'occasion de mon compte rendu. L'auteur s'y est proposé de rechercher quel a été exactement le rôle de l'intelligence dans la préparation de la Révolution, car celle-ci n'a pas été simplement une révolte de la misère et de la faim, ni le fait d'une minorité audacieuse, mais plutôt le plus bel exemple d'une révolution d'origine intellectuelle : " sinon la majorité, du moins une très large minorité, plus ou moins éclairée, conçoit les défauts d'un régime politique, les réformes profondes qu'elle désire, puis entraîne peu à peu l'opinion publique et accède au pouvoir plus ou moins légalement ; les masses suivent parce qu'elles sont, au moins vaguement, préparées à comprendre et à préférer les idées au nom desquelles se fait la révolution." (p. 1). M. MORNET a donc fait une étude fort minutieuse de tous les éléments qui lui paraissaient significatifs : les livres, les journaux, l'enseignement, les académies, sociétés littéraires, cabinets de lecture, clubs, les mémoires, la Franc-Maçonnerie, les influences américaines, etc. Son enquête est divisée en trois parties : I. Les premiers conflicts, 1715-47 ; II. La lutte décisive, 1748-1770 environ ; III. L'exploitation de la victoire, 1771 environ-1787.

"Je m'en suis tenu," dit-il, "à trois périodes que je crois justifiées: 1715-1747 ;

c'est de 1748 à 1750 que paraissent les *Mœurs* de TOUSSAINT, l'*Esprit des lois*, les premiers volumes de l'*Histoire naturelle* de BUFFON, la *Lettre sur les aveugles*, le Prospectus et le Discours préliminaire de l'*Encyclopédie* (Ier volume, 1751), le premier *Discours* de ROUSSEAU, etc... Il y a vraiment là une coupure. Elle est beaucoup moins nette pour notre seconde période (1748-1770); mais il en fallait une; et c'est vers cette date de 1770 que s'achève l'œuvre d'expression des idées et que commence leur diffusion générale. Notre enquête le montrera. (C'est, par exemple, entre 1764 et 1770-1772 que paraissent les plus violents ouvrages polémiques de VOLTAIRE et d'HOLBACH.) " (p. 2).

L'ouvrage est bien conçu, et bien échafaudé, à la fois élégant et solide, mais il me paraît incomplet. La plus grosse lacune c'est l'absence d'indications concernant l'histoire de la science. Sans doute l'auteur renvoit-il parfois à son livre antérieur, mais cela est tout à fait insuffisant, car ce livre n'est pas non plus une histoire de la science, mais seulement une histoire de la vulgarisation scientifique. Il y a bien quelques notes (e.g., p. 324, 475) mais elles sont insignifiantes en comparaison du reste. Or parmi ce que l'auteur appelle les " causes intellectuelles pures," je crois qu'aucune ne fut plus importante que le progrès tranquille et quasi secret de la " science pure." Car voilà la vraie source de lumière qui tôt ou tard dissipe et détruit les préjugés et les superstitions. La monarchie était édifiée sur des préjugés : la royauté de droit divin et les droits presque surhumains de l'aristocratie et du haut clergé, l'identité du roi et de l'état, etc... L'œuvre du XVIIIe siècle ne fut pas une préparation consciente de la révolution (à laquelle nul ne pensait avant 1788) mais plutôt la lente dissolution et destruction des préjugés qui formaient l'assiette de l'Ancien Régime. Or la formation et la diffusion de l'esprit scientifique constituaient la meilleure école d'objectivité et de scepticisme. Le domaine où les idées scientifiques avaient cours était fort limité, surtout au début, mais leur puissance n'en était pas moins considérable, et à la longue irrésistible.

D'ailleurs la science et le goût de la science furent diffusés par les ouvrages de vulgarisation que M. MORNET connaît fort bien, tels que l'*Histoire naturelle* de BUFFON, le *Spectacle de la nature* de l'abbé PLUCHE et tant d'autres, et surtout par l'*Encyclopédie*. La section consacrée à l'*Encyclopédie* (p. 75-80) est faible. Ce n'est qu'un résumé bien entendu, mais il ne contient pas l'essentiel. Il aurait fallu nous dire que l'un des fruits de l'*Encyclopédie* fut la réhabilitation des artisans, la glorification du travail manuel aussi bien que du travail littéraire et artistique. Cela eut certes une influence assez grande et qui dût se diffuser assez vite et donner aux artisans un nouveau sentiment de leur dignité et de leurs droits.

Dans un autre ordre d'idées, je pense qu'il aurait fallu insister davantage sur la littérature érotique, — non pas les contes philosophiques où les

détails érotiques ne sont qu'un piment pour faire avaler le reste — mais la littérature vraiment pornographique qui donne au dix-huitième siècle son caractère fangeux et turbulent. Cette littérature était un véritable ferment de dissolution, et le goût croissant des plaisirs, surtout des plaisirs défendus, un irritant social de tout premier ordre. Le mécontentement de toutes les classes ne pouvait qu'augmenter à mesure que la vie devenait moins simple, et l'amour des plaisirs, le besoin de la débauche, plus répandus.

Les conclusions de l'auteur sont assez différentes de celles de TAINE mais elles sont appuyées sur une documentation à la fois plus vaste et plus sûre. En voici quelques extraits :

" L'esprit qui préparera, puis demandera une réforme profonde de l'État est d'abord un esprit hostile à la religion. Jusque vers 1750, ceux qui attaquent le principe même de la religion, la foi, sont assez nombreux, mais leurs ouvrages, le plus souvent manuscrits, n'ont qu'une diffusion limitée. Par contre, dès le milieu du siècle, c'est la politique même de l'Église qui est violemment condamnée : l'intolérance est ouvertement détestée; on dénie à l'Église le droit d'imposer ses croyances par la force; on dénonce comme des ' crimes ' du ' fanatisme ' tout ce qui, dans le présent ou dans le passé, a châtié les corps sous prétexte de sauver les âmes. Vers 1770, on peut dire que l'opinion est, sur ce point, désormais unanime. L'Église ne renonce pas, en doctrine, au droit du glaive, mais la liberté de croyance et même de culte apparaît à tous comme imprescriptible. A travers tous ces débats, l'autorité politique ne cesse pas d'avoir partie liée avec l'autorité religieuse. Aux exigences du clergé elle n'oppose jamais, avant l'édit de tolérance, ni des principes, ni même des actes; elle se contente, par crainte de l'opinion, de ne pas agir, de ne pas appliquer ses décrets. Ainsi la bataille contre le fanatisme est nécessairement une bataille contre l'autorité politique, contre l'État. C'est l'État qui reste fanatique; c'est contre lui qu'on s'irrite; c'est lui, peu ou pour, que la défaite du fanatisme ébranle..." (p. 471).

" Quelque soit d'ailleurs la diffusion de l'incrédulité et de l'inquiétude politique, elle nous apparaît moins importante qu'une évolution plus générale et plus certaine de l'opinion. La France tout entière se met à penser. A d'autres époques, au XVI^e siècle, par exemple, on peut aligner d'assez longues listes d'ouvrages tout pénétrés d'incrédulité ou d'audaces politiques. Mais ils ne peuvent intéresser qu'une élite assez restreinte. Dans son ensemble, la France se contente de lutter péniblement pour sa vie. Dans la seconde moitié du XVIII^e siècle, au contraire, c'est la France moderne qui s'organise, c'est-à-dire un peuple qui ne veut plus se contenter de vivre mais qui veut apprendre et réfléchir..." (p. 473).

" Et c'est une des raisons pour lesquelles la Révolution n'a pas été le coup de force d'une capitale traînant après elle un pays apeuré ou passif, mais l'aspiration d'un pays tout entier " (p. 475).

" C'est une spéculation vaine de se demander ce qu'il serait advenu de la France et de la Révolution si MONTESQUIEU, VOLTAIRE, DIDEROT, ROUSSEAU n'avaient rien écrit. Mais il semble bien que les mouvements de l'opinion, moins intenses seulement, moins enthousiastes, moins rapides, n'auraient pas été très différents. Les grands philosophes ne révèlent pas des pays inconnus; ils tracent seulement, pour les parcourir, au lieu de mille sentiers où se divise et s'égare le flot des voyageurs, de grandes routes attirantes, commodes, qui font le voyage plus direct et plus sûr.

Je n'ai pas à juger ce voyage. Bon ou mauvais, peu importe pour le sujet que j'ai voulu traiter. J'ai voulu connaître le rôle de l'intelligence dans les origines de la Révolution et non pas instruire un procès. L'enquête semble bien concluante. Assurément, s'il n'y avait eu que l'intelligence pour menacer effectivement l'Ancien régime, l'Ancien régime n'aurait couru aucun risque. Il fallait à cette intelligence, pour agir, un point d'appui, la misère du peuple, le malaise politique. Mais ces causes politiques n'auraient sans doute pas suffi pour déterminer, du moins aussi rapidement, la Révolution. C'est l'intelligence qui a dégagé, organisé les conséquences, voulu peu à peu les États généraux. Et des États généraux, sans d'ailleurs que l'intelligence s'en soit doutée, allait sortir la Révolution " (p. 476).

La disposition des notes à la fin du livre où il est impossible de les lire commodément au moment même où on en a besoin, est tout à fait barbare, et l'absence d'un index pour un livre aussi gros et aussi touffu, qu'il est impossible de relire pour y repêcher un fait ou une idée, est un manque de charité, un abandon du devoir, qui me paraît presque criminel.

GEORGE SARTON.

F. Enriques e **G. de Santillana.**—*Storia del pensiero scientifico.* Vol. I : Il mondo antico. 682 p., 120 illus. Milan, TREVES, 1932.

Of the two authors of this book, the one, FEDERIGO ENRIQUES, needs no introduction to our readers, but the other does, for this is I believe our first opportunity of speaking of him. G. DE SANTILLANA is ENRIQUES' assistant in the Institute of the history of science attached to the University of Rome, which is a kind of national seminary for our studies. In this respect Italy is giving a splendid example to other countries, even to countries which are much richer but " cannot afford " to promote the history of science. They cannot afford it, not because they lack money, but because they lack intelligence and imagination. To return to SANTILLANA, his father DAVID was a distinguished orientalist, professor of Muslim history in the same university. I would have liked to know the share of each author in this book, but no information is given us on the subject.

To return to the book it is a history of scientific thought in classical antiquity and in the early middle ages down to the beginning of the VIIIth century. It is written for students, not for specialists :

"Ora a chi cerca il senso umano dell'idea scientifica, rivolgiamo l'invito d'UGO FÓSCOLO : ' Italiani, io vi esorto alle storie.' A tutte le persone colte in generale, e in ispecie ai filosofi critici e ai lavoratori della scienza, va egualmente l'invito : che vale pure di qua e di là dalle Alpi, ma nella nostra terra si conforta di memorie e di tradizioni più vive " (p. 4).

Italian interest in our studies is partly determined by the desire to understand more completely the antiquity and nobility of Italian culture, and partly by philosophical needs which have been renewed and intensified by the very progress of science. Indeed ENRIQUES belongs

like myself to the group of historians of science who have become historians only gradually and almost in spite of themselves under the increasing pressure of humanistic longings and philosophical perplexities. Thus have wistful scientists in many countries been dragged deeper and deeper into the past. At first they thought that it would suffice to go back to NEWTON and GALILEO—but that did not suffice, for the problems of to-day are older, much older, than GALILEO. Thus ENRIQUES went back to Greece and made a thorough study of the early " physiologists." However, I think that his retrospective evolution is not yet completed ; he has not yet gone back far enough. To be sure there is a first chapter dealing with pre-Hellenic science, but that is obviously insufficient (20 p. out of 658 p., 3 %). The oriental foundation is far deeper, and far more important than he seems to realize.

Another lack of proportion is revealed by the end of his story : the early middle ages deserve to be studied far more carefully, not, because of their additions to knowledge which were negative, but because one cannot understand the transmission of science without analyzing the vicissitudes of European culture. Finally more attention should have been paid to the oriental elements. I am not thinking any more of the Greek origins of modern science, but rather of its Mediterranean origins, bearing in mind that the Mediterranean world was for millenaries the catchment basin of all ideas, scientific, religious, and others, which have become our patrimony.

The subject is divided in logical order which has many advantages but breaks the chronological continuity. The main subdivisions are : I. De natura rerum (history of Greek philosophy from our point of view down to DEMOCRITOS) ; II. The problem of knowledge. Empiricism vs. rationalism (sophists, SOCRATES, DEMOCRITOS, PLATO) ; III. Encyclopaedism, development of particular sciences ; IV. Hellenistic science ; V. Roman science ; VI. The end of ancient science.

It is in part III that the drawbacks of this are most apparent. For example, the chapter on medicine (23 p. !) goes back to prehistoric origins, then sketches the whole development of medicine to the end of the golden age, and is illustrated with a set of Pompei instruments ! In each chapter of that part one must begin by going backwards. This makes for clearness as far as the history of that science is concerned, but it destroys the historical continuity of the whole and obscures our understanding of the development of culture.

The book is beautifully got up and richly illustrated, but some of the illustrations are erratic and irrelevant, and none is properly explained. Few authors have yet understood that illustrations are like museum objects which except from the purely aesthetic point of view, have no

meaning without a label explaining their circumstances, function, purpose. The text is full of wisdom, and is written with Italian lucidity, vivacity and grace. Altogether a very good book though it does not yet satisfy my own ideal. GEORGE SARTON.

Pierre-Maxime Schuhl.—*Essai sur la formation de la Pensée grecque* VIII+466 p. ALCAN, Paris, 1934. 50 fr.

This book, which is included among the publications of the *Bibliothèque de Philosophie Contemporaine*, is a thesis presented for the degree of Docteur ès Lettres at the University of Paris. It has as its subtitle: Introduction historique à une étude de la philosophie platonicienne.

Instead of sinking a shaft deep into the soil of a limited field in the hope of finding new treasure, the author chose rather to plow the surface of a vast area and has turned up—nothing; nothing, unless one except the hypothesis that "ARCHYTASS dut avoir une théorie de l'âme, qui n'est point parvenue jusqu'à nous; du moins paraît-il avoir été le premier à fonder sur les mathématiques une vue d'ensemble du monde, qui éclairait à son tour les disciplines subordonneés" (p. 374). His book is a survey of the development of thought in Hellas from Helladic-Minoan times to the days of PLATO, a period of a thousand years! Superstition, religion, magic, science, philosophy, and a host of related subjects: pollution, purification, curses, prayers, divination, Mycenaean burials, Hittite culture, Cretan worship, the gods of Greece, festivals, mysteries, orphism, city-planning, medicine, money, Egyptian mathematics, Sumerian geometry, and many other topics too numerous to mention crowd and jostle one another in a Gargantuan procession.

There may be readers who will welcome such a conspectus of the important subject which this treatise presents. But the serious student will prefer to turn rather to the books and articles cited in great profusion in the innumerable and often very long footnotes. In fact the chief value of the book resides in these notes and in the extensive bibliography of the writings of modern scholars (pp. 407-466). There are however many omissions such as ADAM *The Republic of* PLATO (1902), BLEGEN *Zygouries* (1928), HEIDEL *The Heroic Age of Science* (1933), NILSSON *Homer and Mycenae* (1933), PERSSON *Die Spät-Mykenische Inschrift aus Asine* (1932), TAYLOR *Plato, the man and his work* (1926), and *Socrates* (1933), ZIELINSKI *The Religion of Ancient Greece* translated by NOYES (1926). American contributions especially are conspicuous by their absence. Although the total number of items cited approximates nine hundred fifty only a scant dozen of these are by American scholars. And although PLATO is cited not fewer than one hundred fifty times and the

closing pages of the book are devoted chiefly to PLATO, the author has never heard of PAUL SHOREY !

There are many typographical errors, especially in the English quotations. Professor BUCK's name is reduced by truncation to a mere CARL DARLING (pp. 78, 419), and the *American Journal of Philology* is referred to as the American Journal of Philosophy (p. 407).

University of California. JAMES T. ALLEN.

Esther Boise Van Deman.—*The building of the Roman aqueducts.* XI + 440 p., quarto, 60 pl., 49 fig. Carnegie Institution of Washington, Publication no. 423. July 1934.

One who travels in Italy, around the Mediterranean or in the Near East is often spellbound by the Roman aqueducts which form such prominent features of the landscapes. And after having witnessed the continual reappearance of such monuments throughout the Roman empire he cannot help feeling a very great respect for the constructive genius of Rome. This may explain Dr. ESTHER VAN DEMAN's vocation. For twenty-eight years she has been studying the structural features of existing monuments of ancient Roman construction. In this study her attention has been directed especially to the characteristics of Roman brickwork and work in concrete. Not only have her investigations necessitated the careful examination of all accessible examples of construction located in Rome and its vicinity but they led her to Sicily, Northern Africa, and Spain where she found important variations in the building technique employed.

Gradually her knowledge of the features characterizing the various periods of Roman building activity, as represented in dated monuments, became so exact that she was able to formulate a canon which she has employed with success in identifying many hitherto perplexing structures and dating them. To complete her major work on Roman construction Dr. VAN DEMAN, some ten or twelve years ago, turned to the study of the vast and imposing aqueduct systems of Rome.

The period of Roman aqueduct construction began with the building of the *Aqua Appia* by APPIUS CLAUDIUS, three centuries before the beginning of the Christian era, and ended A.D. 226 with the building of the *Aqua Alexandrina* by ALEXANDER SEVERUS.

During these five centuries, eleven systems were constructed, in course of which, repeatedly, old aqueducts were repaired and extended only at later times to be successively abandoned, in whole or in part, being superseded by more imposing structures or structures better adapted to the changing needs of a growing city. The records left by contemporaneous writers fix the dates of the aqueducts and of all the principal

restorations but these records are so lacking in identifying detail that the archaeologist of today has found it difficult in many cases to assign existing remains to their original structures and to the periods when they were erected. It is at this point in aqueduct study that Dr. VAN DEMAN has made important contributions, for her knowledge of types of construction characteristic of the various builders has enabled her, as no one else, to establish the identity of hitherto unassignable remains and to reconstruct their structural history.

The results of her investigations have been sumptuously published in this volume illustrated with 60 plates plus 49 textcuts. Many of the photographs have been provided by the Near East Expedition of the University of Michigan, which keeps in its archives a complete series of photographs of all the Roman aqueducts.

After an introductory chapter dealing with the builders of the aqueducts, the following eleven chapters are each devoted to one aqueduct. Appendix A (p. 363-81) contains all the classical references to the subject. Appendix B (385-429) lists all of the remains. The book is a credit to the Carnegie Institution, as well as to the author.

We look forward to the publication of the companion volume, *The Aqueducts of Rome* by Dr. THOMAS ASHBY, which owing to his tragic death, has been unavoidably delayed in the press. G. S.

Lynn Thorndike.—*A history of magic and experimental science. Volumes III and IV: fourteenth and fifteenth centuries.* XXVI+827 p.; XVII+767 p. (History of science society publications, new series, IV). New York, Columbia University Press, 1934 ($10).

The author had already placed himself in the foreground of scholarship with the first two volumes of this work when they appeared in 1923 (see *Isis* 6, 74-89), and the present continuation of it will increase his fame considerably. Indeed good as the first volumes were (if one takes the author's purpose into account), these two are much richer and better. THORNDIKE is truly a palaeographical virtuoso, who has developped an extraordinary flair for interesting MSS., will find his way easily in the most labyrinthic collections of them, and is able to read a dozen of them while a tiro will still be struggling with a single one. Witness the long index of MSS., or of incipits printed at the end of vol. 4. The materials investigated by him are so abundant, and the contents of these volumes so rich, that I shall not attempt to analyze them, at least in this review. However, they will be analyzed in vols. III and IV of my *Introduction*. I shall even include in my *Introduction* various alchemists, astrologers, or magicians, whom I would not have introduced otherwise, either because I did not know of them, or because I had rejected them.

The publication of THORNDIKE's book changes the situation, for it will be easy to refer the reader to it, and to include a number of secondary scientists or pseudo-scientists without devoting too much space to them, and without allowing them to appear in the limelight and to distort the perspective.

I have no intention of repeating the criticisms suggested to me by the first volumes and which apply equally well to the present ones, but I must simply recall that the title of the work is somewhat deceptive. A better one is given by the author himself (III, 22) " a history of the relations between magic and experimental science," and I cannot help regret that it was not used in spite of its length, for it would have saved much trouble and misunderstanding. Indeed the author's subject is neither the history of magic nor the history of science, but rather the history of the wide and undetermined field extending between both of them. If one bears the correct title in mind, or interprets the wrong one correctly, there can be but one opinion of this work : it is a major contribution to the subject, and will probably remain the standard work for a long time to come.

It is also, though indirectly, an important contribution to the history of science. In order to appreciate this we must remember that mediaeval science should be defined very differently from modern science. We draw a line between science and pseudo-science, and in most cases that line can be drawn very sharply ; our mediaeval ancestors drew also a line but in a very different place ; they drew it between legitimate and illegitimate magic, between white and black magic, and that line could not be drawn with any objectivity or with any precision. They did not question the legitimacy of astrology and alchemy, but wondered to what extent these could be properly carried. In addition to these respectable subjects they also dealt with chiromancy, astragalomancy, cosmomancy, sternomancy, alectromancy, pyromancy, alphitomancy, aleuromancy, chritomancy, hydromancy, geomancy, aerimancy, armomancy, catoptromancy, crystallomancy, lecanomancy, and other mancies, and no two men held the same views as to the lawfulness of each, or as to the limit between good and evil in each of those mantical provinces.

Moreover we draw a line between scientific research and erudition, and our scientists and learned men are clearly distinguished ; in the Middle Ages that fundamental distinction was hardly recognized. Learning and science were thought of as one and the same thing. There were of course some people having truly scientific instincts, genuine Archimedean or experimental minds, but such men were generally not learned and could not or did not write with any ease. The best way, then as now, of smothering such genius was to cram it with learning.

Of course learned people spoke of experiments, but they really did not know what they were talking about. THORNDIKE has been time after time the willing victim of such a fundamental misunderstanding, though he seems to have become a little more wary.

To illustrate, consider this remark (4, 115) :

> "In view of GERSON's primarily theological attitude, it is noteworthy that he recognizes the experimental method as characteristic of natural science. In a sermon on CHRIST's nativity he affirms that the experiments of natural philosophy have never reached this point, that a child could be formed without human seed. But this also suggests the association of experiments with marvelous ends and magic."

It is clear that GERSON has no understanding of the experimental method.

Finally there was no clear distinction between theology and science, and every scientific question was likely to become confused with theological arguments. Put all those sources of misunderstanding together : science vs. magic, science vs. erudition, science vs. theology, science vs. general muddle-headedness, and you realize that the history of mediaeval science is vastly different from that of modern science. So different indeed that many scientists of our time have been tempted to dispose of the whole of mediaeval knowledge as rubbish, in which they were deeply mistaken.

THORNDIKE's book might perhaps be called a history of scientific thought, because there is no doubt that mediaeval thought was dominated by astrology, alchemy and manticism, of which he gives us such an elaborate account. Though the difference between science in the making and scientific thought was probably smaller in the Middle Ages than it is now, this book cannot be called a history of mediaeval science. Aside from the fact that it is restricted to the Latin writings, while some of the most important ideas were still expressed in Arabic (at least in the fourteenth century), the purely scientific contents are incredibly small and are concealed by the abundance of magic. THORNDIKE supplies a sort of scientific summary (4, 612-4), which is pitifully meager, especially if one realizes that much of it, much of that little, is not even original but derived from Arabic sources.

The paradox of the history of science is that it deals largely with secret activities. It is the history not of things which were deemed important when they happened, but on the contrary, of things which could not be understood or recognized except much later. Human progress is largely accomplished by a very small group of people working secretly in defiance of the multitude. That is natural enough after all : progress can only be due to people who are ahead of their time and out of joint with it. The learned men and those afflicted with the cacoëthes scribendi

are of very different kidney ; their writings reveal the scientific background and backwaters not the foreground, the thoughts of the conservative rear-guard not of the pioneers.

The magical writings are particularly conservative, and thus, while the history of science is essentially a record of progress, the history of magic is essentially unprogressive. THORNDIKE's field being intermediary, his history is not unprogressive, without being as progressive as a history of science would be. For example, he makes it clear that by the end of the fifteenth century, magic and astrology were already on the defensive (1), —we should say—" more on the defensive than before," for it is a matter of degree, yet they remained supreme, astrology until the beginning of the seventeenth century, and alchemy for two centuries longer.

The scientific thought of our own times is also out of step with science in the making, in spite of intense scientific publicity ; this cannot be avoided, nor is it regrettable, for we must not forget that pioneers are not necessarily right. Indeed they are more often wrong than not, and it is better to let them lose themselves alone than to lose ourselves in their company. However, the main difference between modern and mediaeval times, is that our scientific thought is regulated by various agencies such as academies, societies, periodicals, congresses, and is thus protected against erratic developments and against our innate tendencies to the mysterious, the marvellous and the irrational. Without the existence of those regulative and protective agencies it is clear that we would very promptly revert to mediaeval or even to antediluvian habits of thought. The proof of this is given by the abundance of individual reversion in the face of these agencies. A few years ago I began to review books illustrating such aberrations (2), and I registered many more of them in the Critical Bibliographies of *Isis* (under the heading *Superstition and occultism*), but I soon found that the best that I could do was to mention a few specimens ;—there were too many of them. (3)

To return to THORNDIKE. Let us hope that he may live long enough to extend his investigations to our own enlightened days. He will not lack materials ; his difficulty will rather be to avoid being overwhelmed by their abundance. In the meanwhile one cannot be too grateful to him for his patient and comprehensive investigations of these Latin writings which would be the least tempting to the majority of scholars,

(1) " Astrology at bay " is the title of chapters 61 and 62, but that is perhaps a little too strong.

(2) E.g., HIRAM E. BUTLER : *Solar biology* (23rd ed., 1920; *Isis* 3, 449-50).

(3) In every country. A good many such books are published regularly in English, French, and German, and there is apparently a good market for them.

and hence the most likely to be overlooked. Together with ARMAND DELATTE's studies of Greek mantism (4), they help us to form a better estimate of mediaeval thought.

The History of Science Society deserves to be congratulated for having made possible the publication of this great work. We look forward to its continuation with the deepest interest.

GEORGE SARTON.

Ananda K. Coomaraswamy.—*The transformation of nature in art.* 245 p. Cambridge, Harvard University Press, 1934 ($3).

We have already discussed many times the aesthetical, archaeological, and philosophical views of this great Singhalese scholar (see e.g., 2, 403-7 ; 6, 73-74) and he has done us more than once the honour of discussing them himself in this journal. The present volume is devoted to the explanation of the Asiatic (5) views on art, as opposed to the post-mediaeval Western ones. The misunderstandings between East and West which have developed after the mediaeval period are not insuperable, and we should try to conquer them, in order that East and West may be enriched and both brought up to a higher plane. Of course in this case as in every other complete understanding is only possible when it is willed from both sides, and when no side assumes a dictatorial and supercilious attitude.

Much as I sympathize with what the author has to say, I do not always like his dogmatism. That is not the way to make friends. For example he asserts as a geometric axiom (on p. 4) : " Naturalism is antipathetic to religious art of all kinds, to art of any kind..." According to that definition of art, a good many of the works of art are not works of art at all, and a good many great artists are no artists... Clearly the definition is wrong. The author has every right to dislike naturalism, but not to rule it out of art, where millions of people of all climes are claiming it. He remarks somewhere (p. 34) that " orthodoxy, for the East, is determined by what a man does, and not by his beliefs." Very good. I would apply this to artistic orthodoxy as well as to the religious one ; creeds matter less than their application. The genuine artist who does not care a hang about aesthetical theories, obeys his own instinct : he may be following nature always, or sometimes, or never. The one who follows her " never " is a very rare individual indeed. The most conventional and abstract art is occasionally diversified with little touches of naturalism. The general inspiration may not be naturalistic, but many details are. This is certainly the case for a great many of the

(4) Liége 1927-32 (*Isis* 12, 328-330; 20, 478-80).

(5) Meaning Hindu and Far Eastern views.

Buddhist and mediaeval Christian works of art which I have examined.

Happily the author is not as bad as he pretends to be. He recognizes (p. 169) that " the worshipper, for whom the object was made, is nearer to the root of the matter than the aesthetician who endeavors to isolate beauty from function." Quite so. He will enjoy the symbol and every touch of beauty, whichever its origin. Dr. COOMARASWAMY also says (on p. 152): " In any case, one could not, if one would wish to, turn back the movement of time. To be other than we are would be for us the same as not to be ; to wish that the art of any period had been other than it was is the same as to wish that it had never been. Every style is complete in itself, and to be justified accordingly, not to be judged by the standards of a former or any other age." Of course such a wise remark abolishes dogmatism and helps us to swallow the author's assertiveness with better grace.

Much in this book is too technical and too far remote from our own field to be discussed, but chapter II on Meister ECKHART's view of art will be of special interest to our readers. It is interesting to know a Hindu's reaction to this great master of western mysticism. " His sermons might well be termed an *Upanishad* of Europe " (p. 61). " ECKHART presents an astonishingly close parallel to Indian modes of thought ; some whole passages and many single sentences read like a direct translation from Sanskrit." (p. 201). As direct influences must be excluded in either direction, this identity between ECKHART's philosophy and even terminology and style with those of his Hindu colleagues affords a new proof of the fundamental unity of the human mind, and it confirms my explanation of the identity of Christian mysticism and Muslim *taṣawwuf* (see *Isis* 17, 271-3 apropos of ASIN's *El Islam cristianizado*, 1931). By the way this chapter on ECKHART bears the epigraph : *Docti rationem artis intelligunt, indocti voluptatem* (QUINTILIAN IX, 4), which I thought was the most profound thing that pedantic Spaniard ever wrote, but as a matter of fact the phrase is not profound at all in its dull context.

The book is beautifully printed but the placing of all the notes at the end (a regular practice of the Harvard University Press) is exasperating. This is a real perversion. Footnotes are meant to be seen at one and the same time as the text, and then read if the reader wishes to do so ; it is impossible to read two distant pages simultaneously. Therefore also footnotes should be reasonably short, and longer digressions simply referred to and removed to appendices. When footnotes are separated from the text, either they are disregarded or the reader is obliged to interrupt himself time after time ; either the notes are lost or the reader loses the thread of his own thoughts. The separation of the footnotes

from their context is a pure barbarity which no typographical need can justify.

GEORGE SARTON

Charles Sanders Peirce (1839-1914).—*Collected papers of* CHARLES SANDERS PEIRCE. Edited by CHARLES HARTSHORNE and PAUL WEISS. Vol. V : Pragmatism and Pragmaticism. XII + 455 p. Cambridge, Harvard University Press, 1934 ($5.00). (1)

The content of this review is organized into three parts. In the first part an attempt is made to state what PEIRCE intends to mean by his species of pragmatism (or, as he calls his own species, *pragmaticism*) as expounded in the volume under review. In the second part a very brief critique of the doctrine is suggested. In the third part a study is made of the doctrinal affinities between PEIRCE and WHITEHEAD, and a transformation of the former into the latter is outlined.

I. — *What is Pragmatism?*

The editors of PEIRCE's works make an admirable attempt to summarize under six headings the chief tenets of pragmatism. This attempt is found in their *Editorial Note* of the present volume. In parts II and III of this review the substance of PEIRCE's explicit statements on pragmatism will be treated critically. Here we propose to give in barest outline the main *motif* and the central illumination of the whole doctrine. We are told that pragmatism aims at making ideas clear, or, equivalently, at defining the " rational purport " of concepts or ideas or signs or words or propositions (13, 206, 394, 412, 428, 438, 453). You and I all the time utter sounds and entertain thoughts and images and concepts. What does all this intellectual material, which forms a very important part of our life, *mean*? Pragmatism is a doctrine of the intellectual meaning of concepts.

This doctrine holds that all meaning is to be conceived in terms of further meaning applicable to spatio-temporal human action. If you entertain a concept, and you are challenged to give a rational account, *a logos*, of this concept, you will proceed, if you are a pragmatist, to express that concept's meaning in terms applying directly to human conduct. A concept, therefore, denotes a class of spatio-temporal human processes, each member of which, taken as a *whole*, is an illustration of the concept. But the *meaning* of the concept never resides in its sheerly denoting this class of processes. Although the concept denotes these processes, yet the processes and the concept are utterly distinct metaphysical entities,

(1) All reference numbers in this paper refer to paragraphs, not to pages, in the volume under review.

untranslatable, as to their meaning, into each other. Meaning always appertains to translation *within* the same mode of being. Therefore, the meaning of a concept is itself a class of concepts. In the determination of this class of concepts pragmatism prescribes a rule : you can mean by your concept only such other concepts as apply severally to conceivable human conduct. This conceivable human conduct will constitute features discernible structurally in each member of the original class of human processes denoted by the original concept. The systematic unity of the class of concepts meant constitutes the unity of meaning of the concept in question.

We may state this conception of pragmatism formally. Consider two non-overlapping classes, K_1 and K_2. Let there be a relation R_1 which holds exclusively for members of K_1, such that, for every member x of K_1 there is a subclass K_{1x} of K_1 such that the relation R_1 holds between this subclass and x. And let there be a relation R_2 which holds exclusively for members of K_2, such that, for every member y of K_2 there is a subclass K_{2y} of K_2 such that the relation R_2 holds between this subclass and y. Symbolically stated, these definitions may be put in the forms :

$$(x)K_1 :. (\exists\ Cl\ K_{1x}) : K_{1x} \subset K_1 \cdot K_{1x}\ R_1\ x \qquad (1)$$

$$(y)K_2 :. (\exists\ Cl\ K_{2y}) : K_{2y} \subset K_2 \cdot K_{2y}\ R_2\ y \qquad (2)$$

Furthermore, let there be a relation R_3, distinct from either R_1 or R_2, such that for every x of K_1 there is a y of K_2 such that R_3 holds between x and y. Symbolically, this relationship between K_1 and K_2 is expressible as follows :

$$(x)K_1 : (\exists y)K_2 \cdot x R_3\ y \qquad (3)$$

Let K_1 be interpreted by " the class of all possible human conceptions " ; K_2 by " the class of all possible human actions " ; R_1 by " the meaning of " or " the intellectual purport of " ; R_2 by " discernible features of " ; and R_3 by " directly applies to " or " directly bears upon " or " is directly concerned with " or " immediately denotes " or " exclusively refers to " or " is directly illustrated in." With these interpretations, the above definitions become propositions about human thought and human action and about the relations between the two, and these propositions constitute the doctrine of pragmatism.

Practically every consequence of pragmatism that is truly a genuine consequence of it, and not a foreign accretion resorted to to patch up threatening difficulties, can be shown to be implied in the above three propositions. That pragmatism concerns itself exclusively with the " rational purport " of concepts is taken care of by confining " meaning " to R_1 which holds exclusively within K_1. Whatever is supposed to be

the meaning of a concept, unless that meaning obeys (3) then it is not included in K_1 and hence, by (1), is not a meaning at all. To make an idea clear (13n, 394, 402) is thus to refuse to include in its concept anything that does not obey (3). That the " secret of pragmatism " (130) is disclosed to us by considering the relationships of the three normative sciences (logic, ethics, aesthetics) to each other, and by effecting a reduction of logic to ethics and of ethics to aesthetics (34, 108, 125, 130, 158, 419, 430), follows from the logical nature of R_3, together with extraneous metaphysical assumptions about time. The logical nature of R_3 makes it possible that more than one y could embody an x. If this plasticity of human conduct is thus assumed, and if the ' self-control ' feature of action, which PEIRCE everywhere insists upon, is interpreted to mean a tendency on the part of concepts to receive fixation in conduct, then the logical concept of validity, which is the essence of logic, will tend to fixate in an especial class of arguments (which of course, being human actions, belong to K_2). So long as fixation of the concept of validity is not yet attained, the entertainment of this concept serves to criticise all exploratory rational efforts to realize it, and all such criticism of human effort by entertained ideals is ethical criticism. That pragmatism is a " rule as to the admissibility of hypotheses to rank as hypotheses " (196) follows from the fact that every hypothesis is a human conception and therefore a member of K_1, and that its sole function is to " explain the facts " (197). Now this ' explanation ' merely means to PEIRCE " experimental verification " (197), and experimental verification is nothing other than our R_3 above. That meaning always " lies in the future " (427) and that this consists " in conceived conditional resolutions" (453) of the C. I. LEWIS' type, follow similarly from the above propositions and from the above special assumptions as to the metaphysic of time. For whenever you are challenged as to the meaning of a word you use, or a concept you entertain, you can only ' realize ' the K_{1x} of that concept in the future of the time of the challenge. But there is a necessary stage preparatory for that ' realization.' This preparatory stage of the development of your meaning consists in a set of "if, then " propositions of the general type " if I do so and so, then so and so." If these predictions prove true, then indeed you were entertaining a meaningful concept at the time of the challenge.

II. — *Critique of Pragmatism*

Pragmatism is based on a thoroughgoing sensationalism, of the Lockian-Kantian stripe. " All our knowledge rests on perceptual judgments," we are told (142). Nothing is clearer about PEIRCE than that his thinking is pervaded through and through with the epistemological-introspective

fallacy of seeking one's ultimate understanding of the universe in the momentary self-arrest of the rush of the world and in the subsequent strained inspection of what is then " present to the mind " (44). Scientific truth, on which all PEIRCE's philosophic truth is frankly modelled, is explicitly conceived as absolutely static and finished and lying ' there ' ready to be appropriated (407). The whole philosophy of WHITEHEAD, and the modern Existenz movement in Germany, completely reject this groundless presupposition.

Allied to this conception of ultimate truth as static in its essence is PEIRCE's externalistic and subjectivist attitude towards everything he handles. No warmth, no passion, no self-melting, no love, can possibly figure in the temper that PEIRCE so beautifully perfected. It belongs to his own self-imposed method that this be so. Externalism has a strange way of allying itself with subjectivism, because a genuine regard for the object in its internal self-right necessarily displaces one outside oneself into utter self-forgetfulness. PEIRCE the philosopher is a spectator of the drama of existence, never a maker of difference internally in it. Note especially the pride he takes in the " systematic course of training " he went through in " recognizing " his feelings (112). The scientist-philosopher is wholly other than the *real* man (125), and the twain are by nature decreed never to be one. Everywhere PEIRCE wishes it to be known that he is patterning his philosophy on science and on its experimentalism (384, 411 f., 520). Philosophy is a positivistic science, or it is nothing (13 n., 61, 120, 423). It is " strict science, passionless and severely fair " (537), and how could PEIRCE ever " approve of mixing up Religion and Philosophy " (107). Thus the slightest honest concreteness about life is to be shunned in philosophy like yellow death. I wish there were space to treat his subjectivism critically. But everything, literally everything, is shown by PEIRCE to be ultimately a function of man.

Pragmatism is a purely rationalistic doctrine having to do only with the equivalences of phrases and words (cf. particularly 464). This rationalistic *motif* is betrayed on every side. The strained effort to make all ultimate distinctions fit his tripartite categoreal architectonic, the assigning to sensation a metaphysical function analogous to hypothesis (291), the resolution of freedom into sheer conventionality of arranging human speech (403), and the frank assertion that " pragmatism fails to furnish any translation or meaning " for an individual object (429), are but few instances of PEIRCE's rationalistic bent of mind. With the given individual actualities of history pragmatism has nothing to do. It is a method for making *our ideas clear*.

PEIRCE never wearies of assuring us that his pragmatism does not pronounce ontologically, that it has nothing to do with metaphysics

(423 is typical). Such a claim is impossible. What are PEIRCE's doctrines of fact (85, 197, 387, 430), of time, of the docility of the future, of reality, of perception, of the nature of the soul, of scholastic realism, but special metaphysical doctrines? PEIRCE's pragmatism itself is nothing but a complex function of his fundamental metaphysical views on the world.

Finally we suggest that within PEIRCE's pragmatism a most mysterious final dualism is bound to break out. This dualism may be expressed as that obtaining between our K_1 and K_2 in the first section of this paper: how could these two classes of existents keep house together? In particular, do we not face a residual ultimate mysteriousness in the relation R_3 which claims to enforce metaphysical unity on these two classes?

This difficulty is inherent in all sensationalist approaches to philosophy, in every philosophic attitude which poses itself an external arbiter on, and a spectator of, the world. How could thought ever be related to action? If pragmatism deals solely with the equivalences of conceptions (403, 409, 464), albeit conceptions of practical ends, are we not completely shut up within this conceptual world? What is the ground of the possibility of the communication of this world with the *real* world? What do we mean by "to act according to" a concept (28)? What is this *accordance* between action and thought? If meaning is a matter of "intellectual purport" alone, how could we ever have meaning of *acts* (402 n.)? PEIRCE is alive to this whole difficulty. He registers his awareness of it by his insistence on his theory of scholastic realism, or the reality of Thirdness as Thirdness (93 f., 151 f., 312, 430). The value of this theory, however, can be only in marking an important spot in PEIRCE's system (he would deny he had any special system) where an unsolved and very important problem resides. Properly interpreted, this theory formulates the problem, but does not go one step towards solving it, just because this problem is of that most fundamental character which concerns the very relationship between *theory* and *problem* themselves.

III. — PEIRCE *and* WHITEHEAD

The main positive thesis of this review is that PEIRCE was groping towards a conception of the universe which receives adequate conscious formulation in WHITEHEAD. There are any number of passages and insights in PEIRCE which are very Whiteheadian in character. PEIRCE's insistence on the fact that "the root of every real distinction of thought" lies in "what is tangible and conceivably practical" (400) is generalizable into Professor WHITEHEAD's 'ontological principle.' PEIRCE's famous theory of signs (73, 138, 309, 448 n., etc.) and PEIRCE's undiscourageable optimism over the possibility of solving "any given question" (409)

are transformed by Professor WHITEHEAD into the principle of universal relativity. PEIRCE's insight that a metaphysical " principle of continuity " (436) is needed to guarantee the fact of the passage of the world and to serve as the " real effective force behind " consciousness (289) is precisely what WHITEHEAD means by ' creativity.' WHITEHEAD's sense of *process* is pervasive throughout PEIRCE, particularly in his accounts of perception and of cognition (114 ff., 130 ff., 263 ff., etc.). The two phases of cognition, the " uncontrollable " phase and the " controllable " phase, are analogous to WHITEHEAD's " initial phase " and " second phase." PEIRCE's interesting doctrine of predication (291 ff.), namely, that all sensation and all emotion are the substitution of a simple predicate for a highly complex one, the bringing an enormous antecedent multiplicity to a coherent present unity, is nothing else than WHITEHEAD's doctrine of ' self-formation ' in a rationalistic garb. A Peircian " predicate " stands for the self-unity of an occasion of experience. The procession of such predicates in the world is the genetic rise of occasions in conformity with the order of their environment. It is possible to multiply further these affinities between PEIRCE and Professor WHITEHEAD.

But a word or two should especially be said about PEIRCE's doctrine of Abduction and PEIRCE's famous three categories in their relationships to Professor WHITEHEAD's metaphysic. The point of Abduction is this : if the mind of man, in endeavoring to understand the welter of the world with which it is in constant actual interaction, brings with it to this welter its own idiosyncrasies of structure, its logic, its whole *a priori* apparatus, its infinite field of conceivable possibilities of truth about the world, how could it ever be sure, in selecting one such possibility of truth about the world, and claiming that it is *the* objective truth, that its selection faithfully represents the world? PEIRCE is quite clear on the point that the *a priori* probability of an absolutely foreign mind to the world hitting the right hypothesis about it is nil (172, 591). A doctrine of right guessing is thus required, which refuses to consider the mind completely foreign to the world it inhabits, but which allows it some measure of tune with its world. This doctrine is what PEIRCE variously calls Abduction or Insight or Instinct (173, 181, 431, 604).

Abduction in PEIRCE, purified of its rationalistic flavor, is WHITEHEAD's doctrine of the " conformation of subjective form." According to this latter doctrine, the complete self-feeling of an entity is unique for that entity and cannot be transmitted in its uniqueness to any other entity. But by reason of the " divisible " character of this complete self-feeling, transmission may be made of an abstraction of the self-feeling. Every such abstractive ingredient in the total unity of an entity's self-satisfaction is termed ' subjective form,' and in the genetic passage of one entity

into another such 'subjective form' is actually inherited. Thus the present 'conforms' in some measure to its immediate past. All continuity in nature is 'conformation of subjective form.' Immediacy of self-feeling receives abstractive objectification in its own future. In this way the past drags its *life* on into the future.

PEIRCE sets forth three fundamental categories, to which he gives the colorless names Firstness, Secondness and Thirdness, and proceeds at great length to defend both their independence of each other and their necessary coordinate functioning in every ultimately real element in the world. It is easy to show that this fundamental categoreal scheme of PEIRCE is nothing other than the three synthetic activities of a Whiteheadian actual occasion. Firstness corresponds to the occasion's process of concrescent self-immediacy; Secondness to the physical pole; and Thirdness to the functionings of the mental pole. We believe this close parallelism justifies the view that PEIRCE's conception of the science of phenomenology is analogous to WHITEHEAD's conception of speculative philosophy.

Of course, all such translations from one philosopher to another are not only dangerous, but are definitely illegitimate. Systems of philosophy cohere internally. Each such system provides an *inward unity of grace* which forbids externality of dissection and comparison. But there is little doubt that WHITEHEAD and PEIRCE represent the same basic outlook on the philosophic enterprise. What distinguishes WHITEHEAD from PEIRCE is his immensely enhanced consciousness of the necessity of philosophising systematically; his insistent attempt at self-severance from all rationalistic presuppositions; and his sincere endeavor to wrestle with a much more concrete situation than PEIRCE deemed it desirable for philosophy to wrestle with. It is possible that Professor WHITEHEAD does not go far enough in this last direction (2).

Cambridge, Massachusetts CHARLES MÂLIK.
October 1934.

Jeannette Mirsky.—*To the North!* The Story of Arctic Exploration from the Earliest Times to the Present. With an introduction by VILHJALMUR STEFANSSON. xx+386 pp., 16 pls, 13 maps and 9 figs. in text, 1 folded colored map. New York, The Viking Press. 1934 (Price $3.75).

The history of the exploration of the Arctic reflects the progress of science as well as significant shifts in motivation. The spirit of adventure,

(2) CHARLES S. PEIRCE died twenty years ago but his widow, a French woman, died only recently in 1934. JOSEPH JASTROW paid tribute to her devotion in *Science* (80, 440-1, Nov. 16, 1934.) G. S.

nationalism, a shorter route to the Indies, the profits of whaling, sport, and systematic scientific exploration have all, in varying admixtures, inspired men to invade the realm of ice. Vitamins, control of food spoilage, and the radio have banished some of the miseries and hazards of Arctic exploration, and the aeroplane and dirigible are verifying and completing the map of the Polar regions. NANSEN and the *Fram* set a new pattern of methodical scientific record of the dynamics of the Arctic air, ice, and sea, to be fitted ultimately into the pattern of meteorology, magnetism, and oceanography of the globe as a whole. The Northeast and the Northwest Passages have both been conquered and have given way to the exploration of the airways.

The qualities of Miss MIRSKY's work are lucidly set forth in STEFANSSON's introduction to the book. It is international and does not moralize on the valor of the explorers or the heroism of the seamen or naval officers. In these respects its tone is scientific. The method employed by the authoress is to use the explorers' narratives with only casual reference to the errors, inconsistencies, and imperfections of their records and maps which played so large a part in the tragedies of the North in deflecting the routes of expeditions and in the interpretation of reported results of exploration. The mirage of the ice, the vagaries of the compass, and the ebb and the flow of the Arctic drift, in the absence of accumulated scientific records, left every Arctic explorer in the grip of the unknown.

The failure, misery, starvation, and even cannibalism, which mar the history of Arctic exploration were often, if not always, due to a lack of knowledge of the accomplishments of the Eskimo people, whose adaptations to life amidst the ice and the Arctic night made that environment not hostile but friendly. This factor, overlooked to their undoing by so many explorers, was brought to light by the work of HALL, NANSEN, RASMUSSEN, and STEFANSSON, all of whom endeavored to understand, use, and to extend more widely the conquests of these too often despised simple folk in mode of life, travel, and wresting a living amidst the ice of the polar regions.

The book includes accounts of the early and later Russian discoveries in the Arctic and along the Siberian Coast, and the work of the Dutch, not hitherto generally accessible. There are also valuable summaries of the search for the lost Greenland colonies of the Viking days, the long search for the FRANKLIN Expedition, the heroic and tragic story of the efforts to complete the map of Greenland, and to explore its surface, the quest of the Pole, and flying the Arctic.

The book offers a fine review and summary of Arctic geographical exploration and traces the revolution in the methods used. For the cartographical aspects one must go to NANSEN's *In Northern Mists*, and

for the scientific results to the scattered records which are even yet too incomplete for interesting generalizations. C. A. KOFOID.

Dr. Wu Lien-Teh.—*Manchurian Plague Prevention Service.* Memorial Volume. 1912-1932. 469 pp., 14 pls., 1 in color. Shanghai, China, National Quarantine Service. 1934.

Delegates attending the Ninth Congress of the Far Eastern Association of Tropical Medicine at Nanking in October, 1934, received this handsome memorial volume recording the work of the Manchurian Plague Prevention Service for the two decades of its functioning under Chinese auspices and the able direction of Dr. WU LIEN-TEH. The Japanese occupation of Manchuria has shifted the direction since 1932 into other hands.

The wide distribution of plague as the result of the last pandemic, not only in the tropics but also into temperate zones, and the fact that the pneumonic form was prevalent in man in the winter months in Manchuria, both serve to create a basis for a general interest in the subject among physicians throughout the United States. Added reasons for such interest lie in the facts that in man the pneumonic form of plague is exceedingly fatal, is acompanied by coughing, and is spread by droplet infection in cold climates. Hence no insect vector, such as the rat flea, is directly involved, and no mammalian reservoir host, such as the rat, is necessarily concerned at all throughout the period of a human holocaust.

The sequence of events in the epidemiology of the pneumonic form of the plague in Manchuria was (1) the occurrence of deaths by plague (of the pneumonic type in experimental rodents) among the Tarabagan or Siberian marmots, *Arctomys bobac*, extensively collected for their fur which is used as a substitute for Russian sable, (2) the migrating young of the year may enter old burrows whose former inmates died of the plague and they also acquire the infection and die in their burrows. Other rodents in Manchuria also die of the plague. (3) Chinese coolies from Shantung and elsewhere to the number of 10,000 visit the marmot territories in August-October, collect the skins, and often dig the marmots out of their burrows, and may eat their flesh. These trappers gather in the Manchurian centers of the fur trade in October-November in crowded unsanitary quarters with their (in some instances) germ-laden skins, and, when the sales are made, return to their homes in China. This sets the stage for the tragedy which follows.

In the two major epidemics of pneumonic plague in Manchuria of 1910-1911 and 1920-1921 there were sporadic cases of bubonic plague in August, with the subsequent appearance of the pneumonic type in October, followed by the very rapid spread of this form of the disease

as the trappers exposed to infection from the rodents streamed back to their homes. Persons exposed to droplet infection from human cases scattered from each center after the first death, unless restrained by the authorities in their efforts to isolate those who had been thus exposed. The very rapid course of the disease, the ignorance and terror of the people, and the violence of the soldiery made control doubly difficult. The exclusive operation of human agency by droplet or other contagion is emphasized by the fact that not a single case of rat plague was detected in 13,000 rats examined in cities in which the human pneumonic plague was at the time in full swing. Toward the close of the epidemic, human cases of pulmonary (septicaemic) type tend to increase in number.

Dr. LIEN-TEH cites the prevalent opinion that the rodent disease has long been known among the Manchurian peasantry and the trappers, and that they usually expected the disease among men to run its course and die out. Occasional cases of bubonic and even of pneumonic plague came to record in Manchuria or Siberia between 1911 and 1921, but no great epidemic developed in that interval. The reservoir of rodent plague did not overflow in the interval as in the years of the two epidemics.

The physicians of the United States should be aware that sylvatic plague is established in this country among the rodents as it is in Manchuria. The California ground squirrel (*Citellus beecheyi*, RICHARDSON) and the Oregon ground squirrel (*Citellus oregonus*, MERRIAM) harbor the infection for which their fleas are the insect transmitters. Fortunately the centers of plague infection, as far as known, are few and have been closely watched by the Federal and the California State authorities. Two new centers have, however, appeared in the past summer with devastation of the local rodent populations, both in regions with a sparse human population. Only a single human bubonic case occurred in each of these rodent areas, one of which was chronic. It is obviously the duty of the Federal authorities to see to it that this situation does not get out of control for lack of adequate and thorough inspection.

This memorial volume of Dr. LIEN-TEH's gives the detailed history of the two Manchurian outbreaks, the histology of the lesions, the pathological findings, the clinical symptoms, the morbid histology in human cases of the pneumonic plague, and the pathology in the rodent reservoir animals. There is also a study of insect transmission among rodents, a list of known rodent hosts and of the parasites of these hosts, and discussions of the perpetuation of the plague among rodents and of the " original home " of the plague. Some account of the work of the Plague Prevention Service on cholera and in other fields is also included in the book.

Dr. LIEN-TEH has rendered a great service to the cause of preventive

medicine by his presentation in English of the scattered data in the Chinese reports on these two disastrous epidemics of the most dangerous form of the plague. His book reminds us that rat control can by no means be trusted to protect us from the invasion of plague in its worst form.

CHARLES A. KOFOID.

Forty-second Critical Bibliography

of the
History and Philosophy of Science and of the History of Civilization
(*To end of November* 1934,—*with special reference to the Middle Ages and Byzantium*)

This forty-second Bibliography contains about 835 items of which 145 deal with the Middle Ages and Byzantium. They have been kindly contributed by the fourteen following scholars belonging to six different countries :

C. W. ADAMS (Hertford, England)
H. B. COLLIER (Chengtu, Szechwan)
T. L. DAVIS (Cambridge, Mass.)
A. FRIIS (Copenhagen)
L. GUINET (Brussels)
A. C. KLEBS (Nyon, Switzerland)
C. A. KOFOID (Berkeley, Calif.)
E. KREMERS (Madison, Wis.)
J. PELSENEER (Brussels)
A. POGO (Washington, D.C.)
G. SARTON (Cambridge, Mass.)
L. THORNDIKE (New York City)
M. E. WEEKS (Lawrence, Kansas)
M. C. WELBORN (Cambridge, Mass.)

This Bibliography includes as usual a series of addenda and errata to SARTON's *Introduction to the History of Science*, vols. 1 and 2 (Baltimore and London, 1927 and 1931). Its purpose and methods have been explained in the preface to the thirty-eighth Critical Bibliography (*Isis* 20, 506-8).

The sections on the Middle Ages and Byzantium are especially full, as I have liquidated as much as I could of my stock of notes concerning them. There is also an unusual number of notes on LINNAEUS and Linnaeana, this being a result of my sojourn in Sweden last summer and especially of my delightful never-to-be-forgotten visits to Uppsala, Sigtuna and Hammarby (July 7 to 10). It gives me pleasure to express once more my gratitude to my dear Uppsala friends Dr. ANDERS GRAPE, director of the Royal Library, Dr. NILS JOHAN NORDSTRÖM, professor of the history of science and Dr. ARVID HJ. UGGLA, curator of the Linnaean collections and editor of the *Svenska Linné-Sällskapets Årsskrift*.

I entreat the authors of relevant books and papers to send me copies of them *as promptly as possible* in order that their studies may be registered in this bibliography and eventually reviewed and discussed. By so doing they will not simply help me and every other historian of science but they will help themselves in the best manner for they will obtain for their work the most valuable publicity and its certain and final incorporation into the literature of the subject.

Harvard Library 185
Cambridge, Mass.
GEORGE SARTON.

PART I

FUNDAMENTAL CLASSIFICATION (CENTURIAL)

Vth Century B.C.

Sigerist, Henry E. On HIPPOCRATES. *Bulletin of the Institute of the History of Medicine* 2, 190-214, 1934. ISIS

"The purpose of this very fragmentary review was to give a brief picture of the various activities in the field of Hippocratic research. Important work is being done, work that should be taken into careful consideration by all medical men who talk and write on HIPPOCRATES."

Souques, A. Nature diphtérique de l'épidémie de toux de Périnthe. *Bull. de la société franç. d'hist. de la méd.* 28, 151-55, 1934. ISIS

A propos du sixième livre des *Epidémies*.

IVth Century B.C. (whole and first half)

Netolitzky, Fritz. Die Wiederentdeckung der Atlantis PLATONS. *Cultura* 1, 22-24, Cluj, 1924. ISIS

"Ich bin überzeugt dass PLATON seinen Mittelpunkt der Atlantis, den Poseidontempel (mit Recht oder Unrecht) gleichsetzte dem Heraklestempel von Gades, den Schulten auf der Insel Santipetri nachgewiesen hat. Und damit ist der Triangulierungspunkt erster Ordnung für die Atlantisinsel gegeben."

IVth Century B.C. (second half)

(Aristotle). ARISTOTLE: an excerpt from the General catalogue of printed books in the British Museum. 11+85 p. London, British Museum, 1933. ISIS

Bigelow, R. P. De causis plantarum. *Nature* 133, 951, 1934. ISIS

"It may be of interest to direct attention to the fact that the text of Book I of *De causis plantarum*, with translation and commentary by ROBERT EWING DENGLER, was presented in 1927 as a dissertation for the doctor's degree at the University of Pennsylvania, and was published by the University among the theses for that year."

Krumbiegel, Ingo. Die Thos-Tiere des ARISTOTELES. *Archeion* 16, 24-37, 1934. ISIS

Ritter, Wm. E. Why ARISTOTLE invented the word *entelecheia* (continued). *Quarterly Review of Biology* 9, 1-35, 1934. ISIS

IIIrd Century B.C. (second half)

Shoen, Harriet H. ARCHIMEDES, the reconstruction of a personality. *Scripta mathematica* 2, 261-64, 342-47, 1934. ISIS

Ist Century B.C. (whole and first half)

Hofmann, Jos. E. Über die Annäherung von Quadratwurzeln bei ARCHIMEDES und HERON. *Jahresbericht der deutschen Mathematiker-Vereinigung* 43, 187-210, 4 fig., 1934. ISIS

" Das Problem der antiken Wurzelrechnung lag lange in völligem Dunkel. HERONS Rechnung in den Metrika hat die fraglichen Probleme nur zum Teil erhellt; ob sie je völlig aufgeklärt werden können, ist nicht abzusehen. Die Näherungswerte HERONS für rationale Quadratwurzeln lassen sich fast durchwegs methodisch erklären. Neben dem Heronischen Verfahren des arithmetisch-geometrischen Mittels ist vemutlich bei (kleinen) Radikanden der Form $x^2 - 1$ eine Näherung $\sqrt{x^2-1} \backsim x - \frac{1}{2x-1} + \frac{1}{(2x-1)(2x+1)}$ als Feinmethode verwendet worden. Wird dieses Verfahren weitergebildet, so kann es zur Erklärung der Archimedischen Ungleichung $\frac{265}{153} < \sqrt{3} < \frac{1351}{780}$ dienen. Die übrigen Wurzelrechnungen ARCHIMEDES in der *κύκλου μέτρησις* lassen sich durch Anwendung der Heronischen Methode nach der altbabylonischen Rechenweise restlos erklären. Das Ausscheiden von Wurzelfaktoren ist zu HERONS Zeiten sicher geübt worden. Bei unbequemen Zahlen mag der Rechner die Verbesserung durch Abkürzen vereinfacht haben. Das Bild ist deshalb verschwommen, weil sich zwei verhältnismässig ähnliche Methoden nachweisen lassen, die nebeneinander verwendet worden sein mögen."

Ist Century (whole and first half)

Bologa, Valeriu L. La physiothérapie chez CORNELIUS CELSUS. (In Rumanian). Extras din *Clujul Medical*, no. 8, 8 pl., 1928. ISIS

Brunet, Pierre ; Mieli, Aldo. L'enseignement donné par le philosophe COMARIOS à la sage CLÉOPÂTRE. *Archeion* 16, 18-23, 1934. ISIS

IInd Century (whole and first half)

(Epictetos). EPICTÈTE. Manuel traduit par PHAM-QUYNH. 56 p. Hanoi, NGUYÊN-VĂN VĨNH, 1929. ISIS

Annamite translation in Latin script with preface by G. PEYROT. A part of a library of translations into Annamite entitled " La pensée de l'occident." G. S.

IInd Century (second half)

Balss, Heinrich. Über die Vererbungstheorie des GALENOS. *Sudhoffs Arch. für Geschichte der Medizin* 27, 229-34, 1934. ISIS

(Galen). GALEN's "Advice for an epileptic boy." Translated from the Greek by OWSEI TEMKIN. *Bulletin of the Institute of the History of Medicine* 2, 179-89, 1934. ISIS

IVth Century (whole and first half)

Davis, Tenney L. KO HUNG (PAO P'U TZU), Chinese alchemist of the fourth century. *Journal of Chemical Education* 11, 517-20, 2 fig., 1934. ISIS

Elaborate study on KO HUNG (*Intr.* I, 355) partly derived from Chinese sources, with bibliography. Says the author "He is probably the most outstanding figure in the history of Chinese alchemy. He defended the Taoist doctrines at a time when they had not yet gained wide currency, and propagated them before Taoism had assumed a churchly organization. He was fond of magic, and occupies in the history of Taoism and Chinese alchemy a place similar to that of PARACELSUS in the history of European science." G. S.

VIth Century (whole and first half)

Jeanselme, E. L'eunuque NARSÈS diplomate averti et grand capitaine. *Bull. de la soc. franç. d'hist. de la méd.* 28, 113-21, 1934. ISIS

(Pandects). Conferenze per il XIV centenario delle Pandette 15 dicembre 530—15 dicembre 1930. Tenute da E. ALBERTARIO, V. ARANGIO-RUIZ, B. BIONDI, P. BONFANTE, P. COLLINET, P. DE FRANCISCI, F. DE VISSCHER, B. KUEBLER, FR. PRINGSHEIM, S. RICCOBONO, S. SOLAZZI, L. WENGER. X+373 p. (Pubblicaz. della Univ. Cattolica del Sacro Cuore, series II: Scienze Giuridiche, 33). Mailand, Vita e Pensiero, 1931. ISIS

Reviewed by M. SAN NICOLÒ, *DLZ* 5, 1332-34, 1934.

VIIIth Century (second half)

Neuss, Wilhelm. Die Apokalypse des Hl. JOHANNES in der altspanischen und altchristlichen Bibel-Illustration. Das Problem der Beatus-Handschriften. 2 vols. 294 p., 168 pl., 284 fig. Münster in Westfalen, Spanische Forschungen der Görresgesellschaft, 1931. ISIS

Reviewed by DOROTHY MINER, *Art Bulletin* 15, 388-91, 1933. Students of the Beatus maps (*Introd.* I, 536) may be interested in this. See additional notes by NEUSS and PIOJIAN.

Walter, Georg. Zur Verfertigungsweise des medizinischen Buches um 800 u. Z. (Aus Cod. Leninopolitanus lat. F. v. VI. 3). *Sudhoffs Arch. für Gesch. Med.* 27, 189-92, 1934. ISIS

IXth Century (second half)

Bidez, Joseph. ARÉTHAS de Césarée, éditeur et scholiaste. *Byzantion* 9, 391-408, 1934. ISIS

It is interesting to note that this memoir by the great Belgian Hellenist JOSEPH BIDEZ is published in the *Festschrift* dedicated to himself! G. S.

Gateau, A. IBN 'ABD AL-ḤAKAM. La conquête de l'Afrique du Nord et de l'Espagne. Traduction annotée. *Revue tunisienne* 2, 233-60, 1931; 3, 71-78, 1932. ISIS

Jörg, Edgar. Die EUKLID-Bearbeitung durch ALFREDUS MAGNUS (King AELFRED) nach dem Codex (Z.L.CCCXXXII) B. der Biblioteca Nazionale di S. Marco zu Venedig. *Forschungen und Fortschritte* 9, 275, 1933. ISIS

Incipit " Geometria, sicut et relique discipline..." with a marginal note by the scribe " BOETIUS et ALFREDUS commentant similiter usque in quartum. Quarti libri, que 3 habent commenta videlicet BOETII, ALFREDI et ATELHARTI, et enim similiter BOETIUS et ATELHARTUS commentant in finem." The MS. has been edited at Prof. BOPP's request by Dr. JÖRG, and we hope it may soon be published. G. S.

Muḥammad ibn Saḥnūn at-Tanūkhī of Qairawān (817-70). Les règles de conduite des maîtres d'école. Annoté par ḤASAN ḤUSAIN 'ABDU-L-WAHHĀB. (Commission tunisienne de publication des manuscrits arabes). 64+14 p. Tunis, Imprimerie Al Arab, 1931. ISIS

Entirely in Arabic. The long preface (33 p.) explains the purposes of the Tunisian commission, gives a biography of the author including many anecdotes derived from Tunisian sources, a list of his writings, discussion of the unique MS., etc., then an account of the Tunisian teachers in Islamic days, teaching of girls, teaching methods, selection of teachers, their duties, principles of education, physical exercises, etc. In short a well documented and useful contribution to the study of Islamic education. The text itself covers only 31 p., and is then followed by other texts of a similar kind representing the views of ABŪ BAKR IBN 'ARABĪ, of IBN KHALDŪN, etc. The printing was careless; there were many errors in addition to the long list of errata. G. S.

Sa'di, Lufti M. A bio-bibliographical study of HUNAYN IBN ISHAQ AL-IBADI (JOHANNITIUS) (809-877 A.D.). *Bulletin of the Institute of the History of Medicine* 2, 409-46, 3 fig., 1934. ISIS

Simon, Isidore. ASAPH HA-IEHOUDI. Médecin et astrologue du moyen âge. 98 p. Paris, LIPSCHUTZ, 1933. ISIS

Reviewed by K. J. BASMADJIAN, *Bull. de la soc. franç. d'hist. de la méd.* 28, 61-2, 1934 and in *JQR* 25, 84, 1934. I placed ASAPH JUDAEUS tentatively in IX (2)—see *Introd.* I, 614, but the author following VENETIANER places him two centuries earlier. Says the reviewer: "Dr. SIMON offers a fresh study of the subject, based on a careful examination of the Paris manuscript of ASAPH's work. After a minute analysis of the contents of this manuscript he reaches the conclusion that ASAPH was a real personage who lived in Palestine during the seventh century and for some time was instructor in a medical school in Syria; that his greatest merit was to have stated, ten centuries before HARVEY, that the blood circulates in the veins and to have affirmed, twelve centuries before MENDEL, that ailments are transmitted from parent to child at the moment of fecundation. The analysis of the text is followed by the text itself in the original Hebrew."

Xth Century (second half)

Adler, Ada. SUIDAE Lexicon. Pars II, Δ-Θ, XI+740 p. Pars III, K-O; Ω. XIV+632 p. (*Lexicographi graeci recogniti et apparatu critico instructi*, 1). Liepzig, TEUBNER, 1931-33. ISIS

Reviewed by MAX-RAYMOND SULZBERGER, *Byzantion* 8, 678-79, 1933, and in vol. 9, 459, 1934.

Farmer, Henry George. Who was the author of the "Liber introductorius in artem logicae demonstrationis"? *Journal of the Royal Asiatic Society* 553-56, 1934. ISIS

"One of the best known works of Arabic origin on logic known in the Middle Ages was the *Liber introductorius*, which carried the name of a certain MUḤAMMAD, a disciple of AL-KINDĪ ("collectus a Mahometh discipulo aliquindi philosophi")..." "We find the text of the *Liber introductorius*, almost word for word, in the famous *Rasā'il* of the Ikhwân al-Ṣafâ' and, in consequence, there is no reason why we should not attribute the authorship to MUḤAMMAD B. MA'SHAR (or MUSHĪR or NAṢR) AL-BAYUSTĪ (or BUSTĪ), sometimes called MUQADDASĪ (or MAQDISĪ), who was one of the authors of the famous Rasā'il." The Latin translator was possibly JOHN OF SEVILLE.

G. S.

Kurdian, H. The date of the Oriental geography of IBN HAUKAL. *Journal of the American Oriental Society* 54, 84-85, 1934. ISIS

The author concludes "that IBN HAUKAL's Oriental geography was written before 891, and not 'after the year 902'."

G. S.

MacKinney, L. C. Tenth-century medicine as seen in the *Historia* of RICHER of Rheims. *Bull. of the Institute of the hist. of medicine* 2, 347-75, 1934. ISIS

XIth Century (whole and first half)

Asín Palacios, Miguel. Un codice inexplorado del Cordobés IBN ḤAZM. *Al-Andalus* 2, 1-56, 1934. ISIS

Collection of theological treatises by IBN ḤAZM discovered by H. RITTER in the Library of the mosque Muhammed Fātiḥ in Istanbul. Elaborate analysis together with long extracts in Arabic and Spanish. G. S.

Bravmann, Max. Materialien und Untersuchungen zu den phonetischen Lehren der Araber. XI+135 p. (Inaugural-Dissertation zur Erlangung der Doktorwürde hohen philosophischen Fakultät der Schlesischen Friedrich-Wilhelms-Universität zu Breslau). Göttingen, DIETERICH, 1934.

In appendix to this thesis translation of IBN SINĀ's treatise on the subject : *Asbāb ḥuduth al-ḥurūf* after the edition of MUḤIBB AD-DĪN AL-KHAṬĪB (Cairo, 1332). G. S.

Laignel-Lavastine, M. ; **Naficy, Abbas.** Opération césarienne avec emploi du vin comme anesthésique d'après le " Livre des rois " de FIRDOUZI. *Bull. de la soc. franç. d'hist. de la méd.* 28, 42-44, 1934. ISIS

Ruska, Julius. AVICENNAS Verhältnis zur Alchemie. *Fortschritte der Medizin* 52, 4 p., 1934. ISIS

XIth Century (second half)

Asín Palacios, Miguel. La espiritualidad de ALGAZEL y su sentido cristiano. Tomo I. 532 p. (Publicaciones de las Escuelas de estudios árabes de Madrid y Granada, serie A, num. 2). Madrid, MAESTRE, 1934 (25 pesetas). ISIS

This is another monumental addition to Don MIGUEL's life-long studies of the spiritual and mystical aspects of Islam and their relationships to the similar aspects of Christianity. See his *Islam cristianizado* (Madrid, 1931, *Isis* 17, 271-3). The present work, devoted to the greatest Muslim theologian, AL-GHAZZĀLI, is largely based on the latter's main work *Iḥyā 'ulūmiddīn*, the immense size of which had deterred earlier critics. This first volume is divided as follows :

Prolegómenos; 1. Vida y mentalidad de ALGAZEL; 2. La dogmática de ALGAZEL; 3. La moral religiosa o ascética ordinaria; 4. Ascética purgativa general.

Parte primera; La ascética purgativa especial; 5. Purgación de la sensualidad; 6. Purgación de los vicios de la lengua; 7. Purgación de la ira y el odio; 8. Purgación de la envidia; 9. Del desprecio del mundo; 10. Del desprecio de las riquezas; 11. Del desprecio de la gloria mundana; 12. De la hipocresía espiritual y su purgación; 13. De la soberbia y su purgación; 14. De la vanidad y su curación; 15. De la ilusión espiritual y su curación. G. S.

The Assassins (Footnote to *Intr.* 1, 752-3). For a description of Alamūt and neighborhood see FREYA STARK: *The valleys of the Assassins* (365 p., London, JOHN MURRAY, 1934), a magnificent book of travel, adventure and wisdom. G. S.

Wensinck, A. J. On the relation between GHAZĀLĪ's cosmology and his mysticism. *Mededeelingen d. Koninkl. Akad. v. Wetensch., Lett.*, 75. A, no. 6, Amsterdam, 1933. ISIS

Reviewed in *Al-Andalus* 2, 235, 1934.

XIIth Century (whole and first half)

Abraham ibn Ezra (*Introduction* 2, 187-9). In connection with Professor MARX's note concerning ABRAHAM IBN EZRA (*Isis* 21, pp. 355-56), I might note that the two editions of 1482 and 1485 to which he refers had been already noted in 1923 in my *History of magic and experimental science*, vol. II, p. 927, note 2, and p. 929, note 2, where I also note that the printed edition of the "De nativitatibus" was a quite different version from PETER OF ABANO's translation of the treatise on "Revolutions and nativities." I also gave some information as to manuscripts, which I have since augmented. This appendix of mine on PETER OF ABANO, ABRAHAM BEN EZRA and HENRY BATE is not noted in the bibliography on ABRAHAM in your *Introduction* 2, 187-89. L. T. ISIS

Asín Palacios, Miguel. IBN AL-'ARĪF, *Maḥāsin al-majālis*. Texte arabe. Traduction et commentaire. 106 p. (*Collection de textes inédits relatifs à la mystique musulmane*, t. 2). Paris, GEUTHNER, 1933. ISIS

Reviewed by D. S. MARGOLIOUTH, *Journal of the Royal Asiatic Society*, 846-47, 1934.

Coomaraswamy, Ananda K. The technique and theory of Indian painting. *Technical studies in the field of the fine arts*, 3, 59-89, 2 fig., Cambridge, Mass., 1934. ISIS

"The *Abhilashitārthacintāmaṇi*, or 'Wishingstone of all desirable information,' compiled by SOMEŚVARA, ostensibly SOMADEVA III of the Cālukya

dynasty of Mysore, about 1125 A.D. is an encyclopaedic work, and includes a long section on Painting *(ālekhya-karma)*. Some part of the material corresponds to similar matter in the *Viṣṇudharmōttara*, a work that was already current in the seventh century. On the other hand, the treatment of painting in the *Śilparatna* of Śrī Kumāra, I, 46, a sixteenth century work of Travancore origin and in the *Śiva Tattva Ratnākara* of Basava Rāja, VI, 2, a late seventeenth or early eighteenth century compilation of Kannaḍa (Canarese) origin are immediately dependent upon the *Abhilashitārthacintāmaṇi*, although with abbreviation, expansion, and modification. These facts, together with the evidence afforded by the references to painting in the general literature prove beyond question the continuity of the technical tradition in Indian painting at least from the Gupta period until almost the present day. The *Abhilashitārthacintāmaṇi* provides new information, and is no less valuable in clarifying obscure passages of other authors, which have been imperfectly understood by myself or others. What immediately follows is a literal translation of the passages cited; the various problems raised are discussed in the notes."

Kuzes, A. P. *Τὸ " Περὶ οὔρων " ἔργον τοῦ Ἰωάννου ἐπισκόπου Πριοδριανῶν. Ἐπετηρὶς ἑταιρείας βυζαντινῶν σπουδῶν*, 10, 362-82, facsim., Athens, 1932. ISIS

Edition of this XIIth century treatise on urines (Cod. Vindob. med. 8), which is largely a compilation from earlier texts. G. S.

XIIth Century (second half)

González Palencia, Ángel. IBN ṬUFAYL. El filósofo autodidacto. Nueva traducción española. 201 p., frontispiece. (Publicaciones de las Escuelas de Estudios Árabes de Madrid y Granada, serie B, núm. 3). Madrid, 1934. ISIS

New Spanish translation of one of the great classics of Arabic philosophy (see my *Introduction* II, 354-5), with a brief introduction. G. S.

Lippmann, E. O. von. Die vier Elemente bei ALEXANDER NECKAM (12. Jahrhundert). *Chemiker-Zeitung* 58, 709-16, Köthen, 1934. ISIS

Renaud, H. P. J. Un problème de bibliographie arabe. Le " Taqwīm al-Adwiya " d'AL-'ALĀ'Ī. *Hespéris* 30 p., 1 facs., 1933, 69-98. ISIS

" Dans l'ignorance à peu près complète où l'on se trouve vis-à-vis de ce que fut AL-'ALĀ'Ī, il faut se borner à conclure qu'il s'agit d'un médecin né sans doute en Occident..." en tout cas, un médecin de culture nettement orientale, s'étant fixé en Asie Mineure à la cour de princes d'origine turque, et qui aurait tiré du *laqab* de 'ALĀ' AD-DĪN, porté par l'un d'eux, son surnom d'AL-'ALĀ'Ī. Le XII[e] siècle est d'ailleurs une période au cours de laquelle on assiste à une sorte de reflux de la science arabe occidentale vers les régions

d'où elle était venue un siècle plus tôt. IBN AL-QIFṬĪ et IBN ABI UṢAIBI'A nous donnent les noms d'une série de médecins, nés en Espagne ou au Maghrib, qui vinrent exercer au Caire et à Damas sous les 'Ayyubîtes." Cette étude, qui est un modèle d'analyse d'un problème très difficile, est suivie d'un tableau des médicaments ayant deux ou trois noms arabes. G. S.

Rosenthal, Erwin. AVERROES' paraphrase on PLATO's "Politeia." *Journal of the Royal Asiatic Society*, 737-44, 1934. ISIS

Ibn Rushd (*Introduction* 2, 357). Addition to my note concerning the *Tahāfut at-tahāfut*. Having mentioned the work of KHOJA ZĀDE, I should have mentioned as well the *Dhakhīrat* composed by 'ALĀ-D-DĪN 'ALĪ-Ṭ-ṬŪSĪ (d. 1482) at the request of the same sultan MUḤAMMAD II AL-FĀTIḤ (d.. 1481) in order to decide between the *Tahāfut* of AL-GHAZZĀLĪ and the *Tahāfut at-tahāfut*. This 'ALĀ-D-DĪN is mentioned by BROCKELMANN (2, 204) but not his *Dhakhīrat*. I have just obtained an edition of the latter printed at Ḥaidarābād in India (272 p. octavo). It is said upon its title page that 'ALĀ-D-DĪN wrote it in six months and the sultan gave him ten thousand dirham. G. S.

XIIIth Century (whole and first half)

Sauvaget, J. Extraits du *Bughyat aṭ-Ṭalab* d'IBN AL-'ADĪM. *Revue des études islamiques*, 393-409, 1933. ISIS

Saxo Grammaticus (*Introduction*, 2, 677). A new edition by H. RAEDER and JORGEN OLRIK was published in 1931. Its Latin preface reviews the *Saxo* problems. A succinct bibliography was compiled by Dr. CARL PETERSEN, Librarian in chief at the Royal Library in Apotheker Sibbernsens Saxobog 1927.
(Copenhagen) AAGE FRIIS. ISIS

Thompson, Daniel V. jr. Traktätchen, wie man Tinte und andere Farben bereiten soll, aus MS. Vat. lat. 598 (saec. XIII). *Mitt. zur Gesch. d. Med.* 33, 193-95, 1934. ISIS

Thomson, S. Harrison. GROSSETESTE's topical concordance of the Bible and the Fathers. *Speculum* 9, 139-44, 1934. ISIS

XIIIth Century (second half)

Anianus (*Introduction* 2, 992). E. Z. cites from HOUZEAU two *computi* by AMADUS DERTHONENSIS and JOH. ITALUS as possibly earlier editions than ANIANUS' *Compotus* (Paris, MARCHAND, about 1483). ISIS

The latter, as a *compotus manualis* i.e. with mnemotechnic schemata of left hand is probably the earliest to appear in print and the only one to play a definite role in the development of a practical calendar. Its diffusion in printed form is confined almost entirely to romance countries, mainly to France and issued first and further developed in Lyon. Here the ed. pr. appeared about 1486 and was at once imitated in Paris and Strasburg (earliest dated 1488 ed. without illustrations). The assignation of the ed. pr. to Paris, GUY MARCHAND 1483 must be given up for technical reasons, it was printed not before 1487. Before 1501 the book saw in all 37 editions, i.e. in about 15 years. There is something anachronistic in the great popularity of the *compotus* of ANIANUS, as also in that of the *Lunarium* by GRANOLLACHS (whose 28 editions found a similar distribution) at a time when the serial production of annual calendars was singularily facilitated by the press and actually begun in 1471 by REGIOMONTANUS. Of the two forerunners of ANIANUS only the *Amadeus Derthonensis* (AMADEO de Tortona) Dierum, calendarum... ratio. (Milan, IOANNES BONUS about 1475) is known from several extant copies. Two are in the British Museum, one on vellum (BMC. vi, 729) cf. *Gesamtkatalog* 1594. The other, JOH. ITALUS, *Compotus* 1483, noted by HOUZEAU, is entirely unknown. ZINNER (in *Mitt.* 1934, 33, 278) notes "von Mag. JOHANNES 1375 die bekannte Zeitrechnung (Computus cyrometralis)" among other Erfurt contributions. I cannot trace it, but we have an anonymous *Computus cyrometralis* (Cologne, KOELHOFF) described by POLAIN in his excellent catalogue of incunables in Belgium No. 1139, after the unique copy in Liège (Sém. 6k.i). There may be a connexion between this and HOUZEAU's "ghost." A. C. K.

Davy, J. Burtt. An early record of the Sycamore maple in Britain. *Nature* 134, 61-62, 1934. ISIS

"Examining recently some beautiful stone carvings in the Cathedral of Christ Church, Oxford, I was impressed by the fact that one of them represents, quite clearly and unquestionably, *Acer pseudoplatanus*, although they date from the end of the thirteenth (or early fourteenth) century. Ten species are depicted, seven of which are native British plants, and the others cultivated."

Faraj, abū-l (*Introduction* 2, 975-79). I have received the following intelligence from Mrs. RUTH S. MACKENSEN, Chicago, May 27, 1934, "I noticed that the Beirūt edition of ABŪ-L-FARAJ (1890) omits the famous passage on the destruction of the Alexandrian library which appears in the POCOCKE edition. I wrote the Catholic press asking if there was any MS. justification for the omission and was told that this passage and several others had been cut out by the Turkish government censor. The proofs of several pages, bearing the red pencil marks were sent me. Apparently that edition suffers from what IBN 'ASĀKIR called the 'disease of corruption of the text'." On the other hand the Syrian editor, ANṬŪN ṢĀLIḤĀNĪ was able to fill a lacuna in POCOCKE's edition. G. S. ISIS

Gunther, R. T.; Davy, J. Burtt. The sycamore maple in A.D. 1300. *Nature* 134, 215, 1934. ISIS

Honigmann, Ernst. Zur Chronographie des BAR HEBRAEUS. *OLZ* 37, 273-83, 1934. ISIS

(Jacob ben Maḥir ibn Tibbon). Don PROFEIT TIBBON. Tractat de l'assafea d'AZARQUIEL. Edició crítica dels textos Hebraic i Llatí, amb traducció, pròleg i notes per J. MILLÀS I VALLICROSA. LIII+155 p. (Universitat de Barcelona, Facultat de filosofia i lletres. Biblioteca Hebraico-Catalana, IV). Barcelona, 1933. ISIS

We have already spoken in *Isis* of three volumes of this beautiful series: the first and third devoted to ABRAHAM BAR ḤIYYA were edited by J. MILLÀS I VALLICROSA (*Isis* 14, 476; 19, 385), the second devoted to JOSEF BEN MEIR BEN ZABARA, was edited by IGNASI GONZALEZ LLUBERA (*Isis* 17, 486). We owe this fourth volume again to Professor MILLÀS, who is the leader of the undertaking. It contains the *Kitāb al-'amal bil-ṣafiḥa al-zījīya* of AL-ZARQĀLĪ (on the use of AL-ZARQĀLĪ's astrolabe. See my *Introd.* 2, 851) in Hebrew, Latin, and Catalan, together with an elaborate Catalan introduction (47 p.). It would have been a great convenience to the readers if two of those texts had been printed on opposite pages, e.g., the Hebrew and Latin, or the Latin and Catalan (the second combination would have helped us non-Catalans to learn Catalan !). G. S.

Laignel-Lavastine, M.; Galland, Pierre. LOUIS IX et la prostitution. *Bull. de la société franç. d'hist. de la méd.* 28, 174-77, 1934. ISIS

Nicholson, R. A. Tales of mystic meaning, being selections from the *Mathnawī* of JALĀL UD-DĪN RŪMĪ. Translated with an introduction. XXVIII+171 p., 1 pl. London, CHAPMAN and HALL, 1931. ISIS

Reviewed by E. EDWARDS, *Journal of the Royal Asiatic Society* 581, 1934.

Nicholson, R. A. The *Mathnawī* of JALĀLU'DDĪN RŪMĪ. Edited from the oldest manuscripts available with critical notes, translation, and commentary. Books V and VI. XXIV+8+602 p. (Gibb Memorial, new series, 4; 5). London, LUZAC, 1933. ISIS

Reviewed by R. LEVY, *Journal of the Royal Asiatic Society* 569-71, 1934. Continuation of the fundamental edition begun in 1925 (*Introduction* 2, 874). This is the fifth volume out of six, and the third and last volume of the text. G. S.

Schwartz, Joseph J. A MENELAUS manuscript in the Smith collection, Columbia University. *Scripta mathematica* 2, 243-46, 1934. ISIS

Late Arabic MS. of NĀṢUR AD-DĪN AṬ-ṬŪSĪ (*Intr.* 2, 1003) who completed his edition of MENELAOS' *Spherics* in 1264 or 1265. The beginning of the Arabic text is given (first line printed upside down !). G. S.

Sudhoff, Karl. PETRUS HISPANUS, richtiger Lusitanus, Professor der Medizin und Philosophie, schliesslich Papst JOHANNES XXI. Eine Studie. *Die Medizinische Welt*, Nr. 24, 10 p., 1934. ISIS

Tállgren-Tuulio, O. J. Acerca del literalismo arábigo-español de la astronomía alfonsina. *Al-Andalus* 2, 223-25, 1934. ISIS

XIVth Century (whole and first half)

Greene, Henry Copley. The Black Death, 1348. (The history reference bulletin. Civilization science, letters, arts) 14 Kirkland Place, Cambridge, Mass, April 1934, 2 sections no. 18, Sec. 2, 8 pl.). ISIS

A valuable introduction to the subject with bibliography. G. S.

Spencer, Theodore. The story of UGOLINO in DANTE and CHAUCER. *Speculum* 9, 295-301, 1934. ISIS

Thorndike, Lynn. A mediaeval sauce-book. *Speculum* 9, 183-90, 1934. ISIS

"The author of the work or chapter on sauces with which we are here concerned was MAINO DE' MAINERI, or DE MAYNERIIS, a physician and astrologer of the fourteenth century. His native place appears to have been Milan, and he is sometimes called MAGNINUS MEDIOLANENSIS. He spent, however, some years at Paris, where his name is found in the university records from 1326 to 1336."

XIVth Century (second half)

García Gómez, Emilio. El *Parangón entre Málaga y Salé* de IBN AL-JAṬĪB (1313-74). *Al-Andalus* 2, 183-96, 1934. ISIS

Muḥammad 'Abdullāh 'Unān. IBN KHALDŪN. His life and his intellectual legacy. 190 p. (in Arabic). National Library, Cairo 1352 = 1933. ISIS

In two parts: 1. Biography (p. 11-103). 2. His intellectual and social legacy (p. 107-74). Followed by a bibliography (p. 175-86), Arabic and foreign. G. S.

Peacey, Edith (Nun of the Brigittine Order). SAINT BIRGITTA of Sweden. With a foreword by the COUNTESS of IDDESLEIGH. IX+

300 p., port. London, WASHBOURNE and BOGAN, (undated; imprimatur, Westminster 19 Oct. 1933). 12s. 6d. ISIS

"Though this present Life has been written in the narrative form, every care has been taken to keep within the bounds of truth. No scenes have been created other than those which information from authoritative sources makes permissible."

Saye, Hymen. Translation of a fourteenth century French manuscript dealing with treatment of gout. *Bulletin of the Institute of the History of Medicine* 2, 112-22, 1934. ISIS

"The circumstances leading to the production of the manuscript seem quite clear. JEAN D'ESCH (or JEHAN D'AIX) suffered from gout, and having unsuccessfully consulted the physicians of Metz, probably addressed himself to a certain JEHAN LE FEVRE de Metz (the name occurs at the end of the manuscript) who besides being a fellow-townsman had the additional advantage of residing at the time in the medical center of Montpellier." JEHAN D'AIX "was a member of the famous family and occupied a magistracy in 1373, and died before 1398." G. S.

Steiner, Arpad. The date of composition of MANDEVILLE's *Travels*. *Speculum* 9, 144-47, 1934. ISIS

"Thus, the date of composition of MANDEVILLE's *Travels* may easily have been 1366 as was assumed by WARNER. But whether the dedication addressed to EDWARD III is genuine or spurious, the *Travels* were composed between 1365 and the early part of 1371."

XVth Century (whole and first half)

Bishop, C. W. Chinese voyages in the Indian Ocean in early fifteenth century. *Geographical Review* 24, 672-74, 1934. ISIS

Apropos of P. PELLIOT (1933).

Warburg, A. Eine astronomische Himmelsdarstellung in der alten Sakristei von S. Lorenzo in Florenz (1911). A. WARBURG: *Die Erneuerung der heidnischen Antike*, 169-72, 366, 1 pl. Leipzig, 1932. ISIS

XVth Century (second half)

Collijn, Isak. Våra äldsta boktryckare. Föredrag hållet i Blå hallen Stadshuset den 4 december 1933 vid festen till 450-årsminnet av boktryckarekonstens införande i Sverige. 23 p., 4 fig. *Särtryck ur Svenska Boktryckareföreningens Meddelanden*, häfte 12, 1933. ISIS

Lecture on Swedish incunabula delivered by Dr. COLLIJN, director of the Swedish libraries in general and of the Stockholm library in particular, to celebrate the 450th anniversary of the introduction of printing into Sweden (1483). Four facsimiles. G. S.

(Columbus). Select documents illustrating the four voyages of COLUMBUS. Translated and edited by CECIL JANE. Vol. II. The third and fourth voyages. XC+164 p. London, Hakluyt Society, 1933. ISIS

Reviewed by J. A. WILLIAMSON, *Geographical Journal* 82, 468-69, 1933. "The documents selected are, for the third voyage, the Letter of COLUMBUS to the Spanish sovereigns, and his Letter to JUANA DE LA TORRE; and for the fourth voyage, the Letter to the sovereigns, and the Relation of DIEGO MENDEZ." The Spanish texts and English translations are printed on opposite pages. C. W. A.

Dunn, Thomas F. The *facetiae* of the Mensa philosophica. *Washington University Studies*, 55 p. (Language and literature, 5), 1934. ISIS

"An interesting and little known story collection of the late Middle Ages is that in the fourth book of the *Mensa Philosophica*. This little volume, published early in the history of printing, describes the requisites for a perfect banquet for philosophers. It is divided into four books, or tractates. The first book discusses the food and drink which one should purchase for a banquet and gives philosophic reasons for their selection. The second book illustrates from history and legend the types of persons to be invited to such a repast; the third tells what questions for discussion are appropriate for these gatherings, and the fourth gives a number of *facetiae*, or *ioci*, which may felicitously be brought into the conversation."

Mead, Herman R. A unique GREYFF imprint. *Huntington Library Bulletin* no. 6, 167-69, 1 fig., 1934. ISIS

"In the early years of bookbinding it was customary to use as end-papers, or as linings to strengthen the bindings, whatever waste printed paper might be at hand. The literature of bibliography has many interesting accounts of important discoveries made in such endpapers and linings. The Huntington Library has made some finds of that sort, probably the most important of which is that of an apparently unique *Prognostikon auf das Jahr* 1491, printed by MICHAEL GREYFF, at Reutlingen, in 1491, found as an end-paper in the quarto work, JOHANNES MARIUS PHILELPHUS, *Novum epistolarium* (Basel: JOHANN AMERBACH, 1489)." This almanac was compiled by BARTHOLOMAEUS SCHERENMÜLLER of Aalen in Württemberg, who became a master in Erfurt 1476. No other copy of it is known, nor is his name connected with any other publication. G. S.

Renaud, Dr. ABULCASIS, AVICENNE et les grands médecins arabes ont-ils connu la syphilis? 9 p. *Congrès de Médecine de Tunis*, mars 1934. ISIS

" Les premières indications certaines sur le 'mal franc' tirées des ouvrages médicaux des Arabes sont celles qu'on rencontre chez un auteur de basse époque, DĀWŪD AL-ANṬĀKĪ (DAVID D'ANTIOCHE) et cet écrivain oriental n'a même pas vécu, comme le croit H. GAUTIER, à la fin du XV^e siècle, c'est-à-dire au moment de l'apparition de la syphilis en Europe et en Afrique du Nord, mais au siècle suivant. Pour ce qui est de l'Occident musulman, on n'a eu jusqu'à présent que les renseignements extraits de LÉON L'AFRICAIN et qui datent du premier quart du XVI^e siècle. Antérieurement, il faut bien avouer que rien n'autorise à reconnaître la syphilis dans les manifestations précises ou imprécises de maladies générales ou spéciales dont les grands médecins des siècles glorieux de la science arabe nous ont laissé la description."

Sudhoff, Karl. Zur angeblichen amerikanischen Herkunft der Syphilis für die " Alte Welt." *Die Münchener medizinischen Wochenschrift*, Nr. 15, 8 p., 1932. ISIS

Sudhoff, Karl. Was ist's mit dem Phantom der Herüberkunft der Syphilis aus der " Neuen Welt " 1493? *Forschg. u. Fortschr.* 10, 104-05, 1934. Also in *Archeion* 16, 93-96, 1934. ISIS

Thompson, Daniel V., jr. The " ricepte daffare piu colori " of AMBROGIO DI SER PIETRO DA SIENA. *Archeion* 15, 339-47, 1933. ISIS

Tricot-Royer, Dr. Une charte de PHILIPPE le Bon en faveur des lépreux de Lille. *Bull. de la soc. franç. d'hist. de la méd.* 28, 53-60, 1934. ISIS

Warburg, A. Luftschiff und Tauchboot in der mittelalterlichen Vorstellungswelt (1913). A. WARBURG, *Die Erneuerung der heidnischen Antike*, 241-49, 386-88, 1 pl., Leipzig, 1932. ISIS

Leonardo da Vinci

Capparoni, Pietro. LEONARDO DA VINCI anatomico fisiologico. XX+16 p. Bukarest, Tip. Pressa, 1933. ISIS

Favaro, Giuseppe. Le proporzioni del corpo umano in un codice anonimo del Quattrocento, postillato da LEONARDO. Se e quali tracce di esse possano riconoscersi nel *Canone Leonardesco*. *Reale Accademia d'Italia* 5, 577-96, 6 fig., 1934. ISIS

" L'autore illustra i precetti e le figure concernenti le proporzioni del corpo umano applicate, secondo il principio di VITRUVIO, all' architettura, in un codice quattrocentesco della Laurenziana, contenente postille autografe

di LEONARDO estranee all'argomento; ed ammette verisimile l'ipotesi che questi vi abbia attinto, più che qualche proporzione del suo canone, la primitiva idea della rappresentazione grafica delle proporzioni, per quanto riguarda in modo speciale quelle della testa veduta di profilo e la figura umana nel quadrato e nel cerchio. Dà poi in appendice la trascrizione diplomatica delle postille di LEONARDO ancora inedite."

XVIth Century (whole and first half)

A. — *Mathematics*

Cazalas, E. Les sceaux planétaires de C. AGRIPPA. *Revue de l'histoire des religions* 110, 66-82, 19 fig., 1934. ISIS

Deals largely with magical squares. G. S.

B. — *Physical sciences and technology*

Birkenmajer, Ludwig; **Collijn, Isak.** Nova Copernicana. Vorläufige Mitteilung über jüngst in schwedischen Archiven und Bibliotheken aufgefundene, bisher unbekannte Autographen des COPERNICUS. *Bulletin de l'Académie des Sciences de Cracovie*, classe des *sciences mathématiques et naturelles*, 20-36, 1909). Cracovie, 1909. ISIS

Warburg, A. Heidnisch-antike Weissagung in Wort und Bild zu LUTHERS Zeiten (1920). A. WARBURG, *Die Erneuerung der heidnischen Antike* 487-558, 647-56, 21 pl., Leipzig, 1932. ISIS

Warburg, A. Über Planetengötterbilder im niederdeutschen Kalender von 1519 (1908). A. WARBURG, *Die Erneuerung der heidnischen Antike* 483-86, 645-46, 2 pl., Leipzig, 1932. ISIS

C. — *Natural sciences*

Goldschmidt, E. P. JOHANNES COCHLAEUS and a problem in sixteenth century cartography. *Geographical Journal* 82, 343-50, 1933. ISIS

A detailed discussion of the John Carter Brown Library map in which the name America appears first on a printed map. JOHANNES DOBENECK, born at Wendelstein in Franconia, in 1479, latinized his name into COCHLAEUS, schoolmaster of St. Laurence school at Nürnberg from the spring of 1510 till the spring of 1515, reformed its curriculum by up-to-date methods, and died a canon of Breslau Cathedral in 1552. The evidence leads to the hypothesis that :—' When the handy world-map of the 1513 PTOLEMY came out, it very naturally would suggest itself to him how helpful it would be

if every one of his boys could have such a map—a simple matter in Nürnberg with its numerous expert woodcutters. So he had it copied simply by giving the original map to a woodcutter to cut again. But many of the legends on the Strassburg map were illegible, incorrect, or unclassical, and the ignorant woodcutter would only make matters worse in attempting to copy them. COCHLAEUS therefore would prefer to put in the legends himself in type, so that he could see they were correct. So he went to his printer, either WEISSENBURGER or PEYPUS, and asked for a case of old type to take away and use for this; PEYPUS's *Aristotle* is printed in the very type found on the map." C. W. A.

Kahle, Paul. Die verschollene COLUMBUS-Karte von 1498 in einer Türkischen Weltkarte von 1513. 61 p. Berlin, DE GRUYTER, 1933. ISIS

Reviewed by E. HEAWOOD, *Geographical Journal* 82, 267-69, 1933. "The recent discovery, in the Serai Library at Constantinople, of the western half of a world-map drawn in 1513 by the Turkish admiral PIRI RE'IS, would in any case have been of interest, but has greater claims to attention from its author's statement that for the new lands in the west he had followed a map by COLUMBUS himself. Dr. KAHLE, a Turkish scholar of Bonn, reached the conclusion that the COLUMBUS map used was no other than the lost map sent by the navigator to Spain in 1498. While on the whole his argument is forcible, one cannot help seeing one or two weak points in it." C. W. A.

Nunn, George E. MAGELLAN's route in the Pacific. *Geographical Review* 24, 615-33, 1934. ISIS

Swanton, John R. The landing place of DE SOTO. *Science* 80, 336, 1934. ISIS

D. — *Medical sciences*

Fosseyeux, M. L'humanisme médical au XVI^e^ siècle. *Bull. de la soc. franç. d'hist. de la méd.* 28, 75-95, 5 fig., 1934. ISIS

Lichtwardt, H. A. Ancient therapy in Persia and in England. Being extracts from "Therapeutics of JOSEPH," Herat, 1511 A.D., and from JOHN WESLEY's "Primitive physick". London, 1772. *Annals of medical history* 6, 280-84, 1934. ISIS

Schmutzer, Richard. VESALS Darstellung des Baues der Niere, ein Nachtrag zur gleichnamigen Arbeit HOLLS im Arch. f. Gesch. d, Med. VI, 1913. *Sudhoffs Archiv für Geschichte der Medizin* 27, 187-88, 1934. ISIS

E. — *Alia*

Muḥammad ibn-Aḥmad ibn-Iyās (1448-1522). Badā'i' al-zuhūr fī

waqā'i' al-duhūr. Pt. 4, 906-921 A.H. / A.D. 1501-1515. 29+502 p.; pt. 5, A.H. 922-928. / A.D. 1516-1522. 12+493 p. Edited by PAUL KAHLE, MUḤAMMAD MUṢṬAFA and MORITZ SOBERNHEIM. (Bibliotheca Islamica, 5). Leipzig, BROCKHAUS, 1931-32. ISIS

Reviewed in *JAOS* 54, 213, 1934, in *JQR* 25, 56, 1934, and by HERBERT JANSKY, *OLZ* 37, 693-95, 1934.

XVIth Century (second half)

A. — *Mathematics*

Sarton, George. SIMON STEVIN of Bruges (1548-1620). *Isis* 21, 241-303, 30 figs., 1934. ISIS

Elaborate account of STEVIN's life, works and achievements, together with bibliographical and iconographical notes. G. S.

B. — *Physical sciences and technology*

Johnson, Francis R. THOMAS DIGGES. *Times Literary Supplement*, p. 244. London, April 5, 1934. ISIS

Johnson, Francis R.; Larkey, Sanford V. THOMAS DIGGES, the Copernican system, and the idea of the infinity of the universe in 1576. *Huntington Library Bulletin*, no. 5, 69-117, facs., 1934. ISIS

Very interesting study based on DIGGES' *A perfit description of the caelestiall orbes according to the most aunciente doctrine of the Pyhtagoreans, latelye reuiued by Copernicvs and by geometricall demonstrations approued* (1576). THOMAS DIGGES (ca. 1545-1595) extended the Copernican system to include the conception of the infinity of the universe—without, however, depriving the solar system of its central position even in this infinite universe. DIGGES speaks " of that fixed Orbe garnished with lightes innumerable and reachinge vp in *Sphaericall altitude* without ende. Of whiche lightes Celestiall it is to bee thoughte that we onely behoulde sutch as are in the inferioure partes of the same Orbe, and as they are hygher, so seeme they of lesse and lesser quantity, euen tyll our sighte beinge not able farder to reache or conceyue, the greatest part rest by reason of their wonderfull distance inuisible vnto vs." *A perfit description of the caelestiall orbes* has the distinction of offering the earliest, though fragmentary, English translation of Book I of COPERNICUS' *De revolutionibus*. It is the first English work known to contain a diagram of the universe according to the heliocentric system; this diagram, reproduced here in facsimile, shows the stars at varying distances outside the eighth sphere; it is, apparently, responsible for " the fact that the conception of the varying distances and infinite number of the stars seems very early to have become linked inseparably in the English mind with the Copernican system of the universe." The reprint (16 pages) of *A perfit description* is based on the Huntington Library copy of the 1576

edition; at least half a dozen editions appeared until 1605, always annexed to LEONARD DIGGES' *Prognostication euerlastinge*; of most of these editions only one or two copies are known to bibliographers. A. P.

Sudhoff, Karl. Bibliographie ISAAKS und JOHANN ISAAKS, der "Holländer." *Sudhoffs Archiv für Geschichte der Medizin* 27, 45-50, 5 fig., 1934. ISIS

C. — *Natural sciences*

Darby, H. C. The agrarian contribution to surveying in England. *Geographical Journal* 82, 529-35, 1933. ISIS

"The revolution in surveying which took place from 1550 to 1650 was associated with three developments, increasing interest in navigation, progress in military science, and improved methods of farming. The purpose of this paper is to indicate the contribution of the third factor." C. W. A.

Lippmann, Edmund O. von. Zur angeblichen Entdeckung des Rohrzuckers in der Rübe durch OLIVIER DE SERRES. *Die Deutsche Zuckerindustrie*, Nr. 41, 823, Berlin, 1934. ISIS

Manley, Gordon. The Plancius map of England, Wales and Ireland, 1592. *Geographical Journal* 84, 252-53, September, 1934. ISIS

Manley, Gordon. SAXTON's survey of Northern England. *Geographical Journal*, April 1934. ISIS

D. — *Medical sciences*

Albaric, Docteur. Un médecin ebroïcien JACQUES DUVAL. Son traité des hermaphrodites (1555?-1615?). 49 p. Paris, Librairie LE FRANÇOIS, 1934. ISIS

A brief historical account of a French physician who rescued an unfortunate hermaphrodite from execution. His tract on the case is the first to approach the subject thoroughly from a scientific point of view. C. A. K.

De Lint, J. G. De tentoonstelling en het portret van VOLCHER COITER te Leiden. *Bijdragen tot de geschiedenis der geneeskunde* 14, 101-02, 2 fig., 1934. ISIS

Edgar, Irving I. Medical practice and the physician in Elizabethan England and in SHAKESPEARE's dramas. *Medical life* 41, 331-50, 1934. ISIS

"Sixteenth century Englishmen were occupied a great deal more with

medical matters than we are today, and for very compelling reasons as we shall see. The presence of so much medical material in SHAKESPEARE's works is nothing unique or unusual among dramatists of his day, as so many commentators seem to imply."

Jeanselme, E. Des maladies régnantes aux Indes portugaises à la fin du XVI[e] siècle d'après GARCIA D'ORTA. *Bull. de la société franç. d'histoire de la médecine* 28, 215-27, 1934. ISIS

Orta, Garcia da. Comemoraçao do quarto centenario da sua partida para a India em 12 de Marco de 1534. Coimbra, Imprenza da Universidade, 1934. ISIS

A biography of the author of the *Coloquios dos simples, drogas he cousas mediçinais da India*, published in 1563. (*Isis* 2, 415-18). M. C. W.

Pomeranz, Herman. Medicine in the Shakespearean plays and era. *Medical life* 41, 351-76, 479-532, 1934. ISIS

"SHAKESPEARE, like MOLIÈRE, had a profound contempt for medical men in general. But SHAKESPEARE's contempt is not surprising in view of the fact that England, in his time, especially the area between Stratford and London, was overrun with quacks."

XVIIth Century (whole and first half)

B. — *Physical sciences and technology*

Doublet, E. Le procès de GALILÉE. *Rev. Sc.* 71, 550-54, 1933. ISIS

Vollgraff, J. A. Heeft VINCENZO GALILEI op zijn sterfdag zijne uurwerken vernield? *Hemel en Dampkring* 32, 5-8, 1934. ISIS

Zinner, Ernst. JOHANNES KEPLER. Der grosse Führer und Mensch. 58 p. (*Colemans kleine Biographien*, H. 41, hrsg. von FRITZ ENDRES). Lübeck, CHARLES COLEMAN, 1932. (60 Pf.) ISIS

Inhalt: Das Geschlecht KEPLER; Seine Familie; Seine Laufbahn; Seine Forschungen; KEPLER und die deutsche Sprache; KEPLER als Erfinder; KEPLER und die Sterndeutung; Sein Glaube; KEPLERS Mutter als Hexe angeklagt; Rückblick; Literatur. "Sohn eines Abenteurers und einer Hexe, verfolgt von der katholischen Kirche und ausgeschlossen vom heiligen Abendmahl der Evangelischen, kaiserlicher Mathematiker und doch mit der Not kämpfend, erfolgreicher Sterndeuter und doch Vernichter des Sternglaubens, hervorragender Sternforscher und doch dem Volk weniger bekannt als GALILEI, so stand KEPLER vor seinen Zeitgenossen. Erst allmählich erfasste die Nachwelt seine Bedeutung. Langsam setzte sich die Erkenntnis durch, dass ihm mehr als GALILEI das Verdienst zukomme, den von KOPPERNIK begonnenen Durchbruch der neuen Gedanken durch das

Gestrüpp antiker Vorstellungen vollendet zu haben. Aber noch wissen nicht alle Deutschen, dass KEPLER in seinem Ringen um Erkenntnis und in seiner Standhaftigkeit inmitten der religiösen Verfolgungen immer ein Vorbild sein wird..."

C. — *Natural sciences*

Gille, M. Comment GUY DE LA BROSSE fonda le Jardin des Plantes. *Revue pratique de biologie appliquée, de Hallion*, 26, 234-41, 1933. ISIS

Reviewed in *Bull. de la société franç. d'hist. de la médecine* 28, 252, 1934. See *Isis* 1, 359-69, 1913.

Lynam, Edward. WOUTNEEL's map of the British Isles, 1603. *Geographical Journal* 82, 536-38, 1933. ISIS

" HANS, or JOHN WOUTNEEL was a Flemish bookseller, who lived in London, c. 1585-1607, and seems to have become a naturalized Englishman." C. W. A.

D. — *Medical sciences*

Beijerman, J. J. Een probaat middel tegen de pest en andere besmettelijke ziekten. *Bijdragen tot de geschiedenis der geneeskunde* 14, 79-80, 1934. ISIS

Apropos of the royal physician Sir THEODORE TURQUET DE MAYERNE (1573-1655). G. S.

Capparoni, Pietro. Il manoscritto di GASPARE ASELLI sulla scoperta dei vasi chiliferi. *Boll. Ist. Stor. Ital. Arte Sanit.* 13, 299-313, 15 fig., 1933. ISIS

Minkowski, Helmut. Einordnung, Wesen und Aufgaben der Heilkunst in dem philosophisch-naturwissenschaftlichen System des FRANCIS BACON. Zur Kenntnis der Beziehungen zwischen Medizin und Philosophie im 16. und 17. Jahrhundert. *Sudhoffs Arch. für Geschichte der Medizin* 27, 299-327, 1934. ISIS

Vernadeau, Pierre. Le médecin de la Reyne. 89 p., 8 illus. Paris, NOËL et STEELE, (s.d., 1934). ISIS

Edition de luxe admirablement illustrée de la biographie (déjà parue dans *Aesculape*) du Dr. PARDOUX GONDINET (1617-79), médecin d'ANNE d'Autriche (1601-66), fille de PHILIPPE III d'Espagne, femme de LOUIS XIII, régente (1643-61) pendant la minorité de son fils, LOUIS XIV. G. S.

E. — *Alia*

Monteiro, Arlindo Camilo. De l'influence portugaise au Japon. Quelques passages du Prof. GUILLAUME DUVAL de la Faculté de Médecine de Paris (1612-1646). 30 p., figs. Lisbonne, 1934. ISIS

Picard, Emile. Edition nouvelle du *Discours de la méthode* de DESCARTES. 10 p. Paris, GAUTHIER-VILLARS, 1934. ISIS

" Les anciens Centraux bibliophiles veulent rendre hommage à DESCARTES en faisant paraître le *Discours de la méthode* dans les admirables éditions qu'ils ont commencé à publier. Il leur a paru nécessaire d'avoir une introduction pour ce volume, et ils ont pensé à leur ancien Professeur de l'École, qui eut sans doute l'imprudence de leur dire jadis quelques mots dans son cours de Mécanique sur l'œuvre du grand philosophe. J'ai été très touché de leur aimable intention, mais j'ai d'abord hésité à ajouter quelques courtes pages à tant de profondes études sur DESCARTES. En satisfaisant au désir qui m'a été exprimé, je n'ai ici d'autre but que de faciliter peut-être à plusieurs la lecture du *Discours*, et de présenter quelques remarques, sur l'œuvre scientifique de DESCARTES."

XVIIth Century (second half)

A. — *Mathematics*

Inglis, A. The arc of an ellipse. *Mathematical Gazette* 17, 327-28, 1933. ISIS

On an early attempt at rectification in 1671, by JAMES GREGORY (1638-1675). C. W. A.

Newton, Isaac. Mathematische Principien der Naturlehre. (Einzige deutsche Übersetzung) von J. P. WOLFERS, Berlin, 1872. VIII+666 p., 285 fig. Leipzig, KOEHLER, Neuausgabe von 1932. ISIS

Die einige Zeit später erschienenen 6 Seiten umfassenden " Berichtigungen" sind hier bis auf wenige Ausnahmen berücksichtigt worden. Das ist ein wesentlicher Vorteil genegüber der unberichtigten Original-Ausgabe und macht dieses nie veraltende Fundamentalwerk besonders begehrenswert.

Rebel, Otto Julius. Der Briefwechsel zwischen JOHANN (I.) BERNOULLI und dem MARQUIS DE L'HOSPITAL in erläuternder Darstellung. VII+46 p. Bottrop i. Westf., POSTBERG, 1934. ISIS

Schlosser, Edgar Oswin. Die Rezensionstätigkeit von LEIBNIZ auf mathematischem und physikalischem Gebiet. 57 p., 9 fig. Bottrop i. Westf., POSTBERG, 1934. ISIS

Simons, L. G. Books on mathematics in the library of a New England minister of the seventeenth century. *Scripta mathematica* 2, 294-95, 1934. ISIS

SAMUEL LEE (1625-91).

Simons, L. G. CHRISTOPHER WREN. *Scripta mathematica* 2, 362, 1934. ISIS

Smith, David Eugene. An interesting document relating to American mathematics. *Scripta mathematica* 2, 221-23, 1934. ISIS

Apropos of a MS. owned by the Hon. LEVERETT SALTONSTALL, a summary of arithmetic, geometry, and astronomy, used at Harvard University before 1700. "The manuscript is evidently that of a teacher or of a superior type of pupil. It refers to BRIGGS, OUGHTRED, RAMUS, and APOLLONIUS, and among the dates mentioned are 1661, 1675, 1677, and 1680, so that a tentative date of about 1680 may be assumed. Considerable use is made of decimals and of at least four decimal symbols, including the present English, American, and Continental decimal points and a symbol used by OUGHTRED. There are two symbols (. and :) for ratio and the double colon is used for proportion. The arrangement of any space allowed to the various topics shows that, as was was the custom of the time, the objective of a course in mathematics was navigation or astronomy, the two being closely related." G. S.

B. — *Physical sciences and technology*

Forti, Umberto. Nel terzo centenario di CRISTIANO HUYGHENS. 15 p., *Nuova Antologia*, 16 Dicembre 1929. ISIS

Fulton, John F. Addenda to a bibliography of the Honourable ROBERT BOYLE. 27 p., 2 pl. Oxford Bibliographical Society, *Proceedings and Papers* 3, 339-65, Oxford 1933. ISIS

FULTON'S excellent bibliography of BOYLE has been reviewed in *Isis* 21, 378. It will suffice to announce the publication of these copious addenda, which should be henceforth inseparable from the main volume. G. S.

Kremers, Edward. History of chemistry reader: 1. The sceptical chymist by ROBERT BOYLE, 1661. *Am. Journ. Pharm.*, Dec. 1932. ISIS

The Preface of this classic arranged for reading by the five characters involved. The introduction provides an explanation of the several characters, also suggestions for a stage setting. This method of presentation has been used repeatedly by the writer while conducting classes in the history of chemistry and was found to give an added interest to the subject. E. K.

Thorpe, W. H. The (second) Marquis of Worcester and Vauxhall

(1601-67). *Transactions of the Newcomen Society* 13, 75-88, 1932-33. ISIS

Vollgraff, J. A. CHR. HUYGENS en het ankerechappement. *Hemel en Dampkring* 32, 90-91, 1934. ISIS

Vollgraff, J. A. Heeft Prins LEOPOLD gezegd dat in 1656 te Florence een slingeruurwerk is geconstrueerd? *Hemel en Dampkring* 32, 56-63, 1934. ISIS

Vollfgraff, J. A. De relativiteit der beweging volgens CHR. HUYGENS. *Hemel en Dampkring* 32, 195-200, 1934. ISIS

D. — *Medical sciences*

Anspach, Carolyn Kiser. Medical dissertation on nostalgia by JOHANNES HOFER, 1688. Translated. *Bull. of the Institute of the hist. of medicine* 2, 376-91, 3 fig., 1934. ISIS

Capparoni, Pietro. Una raccolta di incisioni per un' opera di patologia e clinica chirurgica di GUGLIELMO RIVA mai pubblicata. *Rivista di Storia delle scienze mediche* 25, 91-115, 14 fig., 1934. ISIS

De Lint, Jan Gerard. FREDERICH HOFFMANN's Man as a machine. *Medical life* 41, 169-76, 1934. ISIS

Goulard, R. Quelques maîtres-chirurgiens Briards. V. FRANÇOIS DOGUET (1625-1695). *Bull. de la soc. franç. d'hist. de la méd.* 28, 96-102, 1934. ISIS

Kanner, Leo. CHRISTIAN FRANZ PAULLINI (1643-1712). *Medical life* 41, 231-70, 3 pl., 1934. ISIS

> "The textbooks dealing with the history of medicine have very little, if anything, to say about CHRISTIAN FRANZ PAULLINI, one of the most highly honored, most versatile, yet least original men of his time, the author of numerous books containing approximately 18,000 printed pages, a physician, theologian, philosopher (of a kind), historian, botanist, zoölogist, traveler, geographer, poet, translator, editor, compiler, a friend of princes, bishops and the outstanding savants of his age."

Lacassagne, Jean. A propos de NICOLAS DE BLÉGNY. *Bull. de la soc. franç. d'hist. de la méd.* 28, 68-69, 1934. ISIS

Penning, C. P. J. JAN ANTONISZN VAN RIEBEECK en zijn dagboek.

Bijdragen tot de geschiedenis der geneeskunde 14, 103-16, 1 fig., 1934. ISIS

Rolleston, Sir Humphry. THOMAS WILLIS. *Medical life* 41, 177-91, 2 fig., 1934. ISIS

Thorndike, Lynn. Another glimpse of medicine in the seventeenth century: BEUGHEM's bibliography. *Annals of medical history* 6, 219-23, 1934. ISIS

Apropos of CORNELIUS A BEUGHEM (fl. 1678-1710): *Bibliographia medica et physica novissima.*

E. — *Alia*

Hamilton, Raphael N. The early cartography of the Missouri Valley. *American historical review* 39, 645-62, 4 fig., 1934. ISIS

Ponsonby, Arthur (Lord PONSONBY of Shulbrede). JOHN EVELYN, Fellow of the Royal Society, author of *Sylva*. XII+350 p., port. London, HEINEMANN, 1933 (15 s.). ISIS

This life by Lord PONSONBY pictures the man, his interests, and his relations to his fellows and times. It is drawn from writings, letters, and his remarkable diary. He was a singularly distinguished figure in his breadth of culture, scholarship, and influence, and a silent methodical genius. In his long life of 85 years (1620-1706) he was the intimate friend of kings, the confidant of statesmen, and a distinguished Fellow of the Royal Society, but he never held any high office or public post of importance. Yet he always labored for the interests of the best social, artistic, religious, and scientific interests of his times. He studied at Balliol, travelled extensively in Europe for twelve years, meeting men of affairs and interesting himself in languages, the arts, and nature. His notes, now in the British Museum, and his writings indicate his interest in horticulture, forestry, botany, mathematics, chemistry, and astronomy, as well as in many fields in the humanities. EVELYN was one of the original members of the Royal Society of London, along with BOYLE and WREN, when it was organized as the Philosophic Society in 1661. He gave the name "Royal Society" to the organization in his dedicatory epistle to his translation of NAUDÉ's *Avis pour dresser une Bibliothèque*. He was a member of the Council, assisted in drawing up its Statutes, was its Secretary for many years, twice refused the Presidency, and attended the St. Andrews Day dinner for thirty-five years without a break. His diary contains accounts of the exhibits and discussions before the Society, and his *Sylva* was read at the meetings in abbreviated form. His interest in natural history was wide. It took permanent form in his writings and translations and especially in his *Sylva* (1664), of which there were three editions in his lifetime and seven at later dates. His work enriched the English language, beautified the English scene, and widened the culture of the seventeenth century in the arts and sciences. C. A. K.

Spectator. Een groot dialecticus van de bourgeoisie. *De Communist*, no. 9, 248-58, 1934. ISIS

Apropos of LEIBNIZ.

XVIIIth Century (whole and first half)

A. — *Mathematics*

Bradley, A. Day. A manuscript *Rechenbüchlein* of 1727. *Scripta mathematica* 2, 235-41, 1934. ISIS

Janet, Paul. Un manuscrit inédit de d'ALEMBERT. *C. R. Ac. des Sc.* 196, 452-55, 1933. ISIS

Walker, Helen M. ABRAHAM DE MOIVRE. *Scripta mathematica* 2, 316-33, 1934. ISIS

C. — *Natural sciences*

Beskow, Karin. LEVERTINS Linnéuppfattning. *Svenska Linné-Sällskapets Årsskrift* 17, 91-117, 1934. ISIS

"Miss KARIN BESKOW, herself a granddaughter of the well-known zoologist T. TULLBERG and a descendant of LINNAEUS deals with the appreciation of LINNAEUS which is found in the posthumous and unfinished work *Carl von Linné* (1906) by OSKAR LEVERTIN, the Swedish poet and scholar. The chief merit of the book appears to be that it has drawn the attention to the purely literary achievements of LINNAEUS, to his strongly poetical conception and the simple characteristic style of his diaries and speeches, which have had great influence upon later authors."

Campbell, Åke. Landskapsbilden i LINNÉS skånska resa. Föredrag vid Svenska Linné-Sällskapets sammanträde den 28 november 1932. *Svenska Linné-Sällskapets Årsskrift* 16, 63-99, 10 fig., 1933. ISIS

"The landscape in the Scanian journey of LINNAEUS. Commissioned to undertake this journey in 1749 by the Houses of Parliament, LINNAEUS chiefly had to study economic conditions. His diary, however contains not only notices of practical importance but also a number of masterly descriptions of landscapes. **Dr.** CAMPBELL's paper affords us an analysis of these descriptions based upon contemporary surveyor's maps and other materials."

Dièreville. Relation of the voyage to Port Royal in Acadia or New France, by the SIEUR DE DIÈREVILLE. Translated by Mrs. CLARENCE WEBSTER. Edited with notes and introduction by JOHN CLARENCE

WEBSTER. XV+324 p., Toronto, The Champlain Society, 1933. ISIS

A French surgeon and botanist who made two voyages to Acadia, 1699-1700; he made accurate descriptions of the native flora and fauna. Reviewed by J. B. BREBNER, *American historical review* 39, 781, 1934. M. C. W.

Drake, Gustaf. Hypothesis nova de febrium intermittentium causa. LINNÉS doktorsavhandling i Svensk översättning. Med inledning och kommentar. *Svenska Linné-Sällskapets Årsskrift* 16, 43-62, 1933. ISIS

"In the summer of 1735 LINNAEUS started upon the journey to Holland which made an epoch in his life. He then aimed chiefly at obtaining a doctorate of medicine which at that period was unobtainable in Sweden. Already three years earlier, upon his return from the celebrated voyage to Lappland, he had fixed upon a topic for his thesis. In his diary he had jotted down some observations concerning the spread of the ague throughout the Northern provinces of Sweden and added: 'I suggest that I have thus found out the origin of the ague etc. To be spared for a thesis of doctorate'. When leaving Sweden he brought with him, together with several other unprinted works which were soon to make him famous, the manuscript of this thesis *(Hypothesis nova de febrium intermittentium causa)*. Upon arriving at the small university of Harderwijk the thesis won the approbation of JOH. DE GORTER who was to bestow upon him his degree. Already on June 23d—six days after his arrival—he had seen it through the press; and upon having defended it 'with présence d'esprit and excellent wit' he obtained his degree. Mr. GUSTAF DRAKE, apothecary at Teckomatorp (Scania), now publishes a translation, with introduction and notes, of this work by the juvenile LINNAEUS. With his usual intrepidity LINNAEUS here develops the hypothesis according to which the ague takes rise from the muddy water prevalent in certain localities. The microscopic mud particles mix with the food and drink and thus penetrate into the blood; in this way they finally shut up the pores and form an obstacle to perspiration. He arrived at this conclusion by observing the endemity of the ague within muddy areas, while it is non-existent in Norrland where the soil is never muddy. This hypothesis LINNAEUS had to abandon during later years; but at the bottom of it was one correct observation, viz. the connection of the ague with marshy ground."

Favaro, Giuseppe. Un trattato manoscritto latino di *Anatomia* di NATALE SALICETI (1715-1789). *Bollettino dell'Istituto Storico Italiano dell'Arte Sanitaria*, 33, 11 p., 1934. ISIS

Gertz, Otto. Celsiska herbarieväxter i Lund. *Svenska Linné-Sällskapets Årsskrift* 16, 133-36, 1933. ISIS

"Dr. O. GERTZ enumerates those specimens of plants, now preserved in the Botanical Museum at Lund, which once belonged to Dean OLOF CELSIUS, the friend and benefactor of LINNAEUS."

Grape, Anders. Linnaeana bland J. G. ACRELS papper i Karolinska Institutets Bibliotek. *Svenska Linné-Sällskapets Årsskrift* 16, 112-20, 1933. ISIS

" Dr. A. GRAPE, chief librarian of the University Library, has unearthed in the library of the Caroline Institute at Stockholm a number of documents important to the biographer of LINNAEUS. A great part of them were written by J. G. ACREL who represented the LINNAEUS family at the sale of his herbarium and manuscripts to JAMES EDWARD SMITH in 1784 and consequently refer to this transaction. There was also found one of the very few letters to LINNAEUS from his pupil DANIEL SOLANDER, written during his South American tour in the company of Sir JOSEPH BANKS. A collection of LINNAEUS's own outlines of speeches etc. is also of interest."

Hult, O. T. Om LINNÉ och " den osynliga världen." *Svenska Linné-Sällskapets Årsskrift* 17, 118-28, 8 fig., 1934. ISIS

" LINNAEUS and microbiology. It has been suggested that L. was rather averse to the use of the microscope; the author here tries to put together the known notices concerning such instruments possessed and made use of by L. and also gives an outline of microscopic developments. There still exist two microscopes which are thought to have belonged to LINNAEUS. One of these he presented, in 1738, to B. DE JUSSIEU—it is now in the U.S.A.—while the other one belongs to the museum of the public school in Skara (Vestrogothia). In a following publication the learned author will deal with those passages from LINNAEUS's own works where he speaks of infectious organisms invisible to the eye, the existence of which he presaged."

(Linné). Innehållsförteckning till Årgångarna 1-15 (1918-32). (Index to vol. 1-15, 1918-1932). *Svenska Linné-Sällskapets Årsskrift* 15, 157-64, 1932. ISIS

Nybelin, Orvar. Tvenne opublicerade Artedi-manusckript inför 200-Årsminnet meddelade. *Svenska Linné-Sällskapets Årsskrift* 17, 35-90, Uppsala, 1934. ISIS

" Contains two manuscripts of the famous ichthyologist PETER ARTEDI. At his tragical death in Amsterdam in 1735—he was then only thirty years old—A. left his epoch-making work *Ichthyologia sive opera omnia de piscibus* in an unpublished state. Thanks to the sacrifices and efforts of his friend LINNAEUS this work was published in 1738; and thus the fame of A. as being the founder of ichthyology was once for all assured. LINNAEUS, in his preface to the work, tells us that A. was well at home in many other branches of natural science; but until now only a small botanical manuscript of his has been published (by Professor E. LÖNNEBERG). There exists, however, in the Library of the Royal Academy of Sciences in Stockholm a copy of a manuscript by A. in which he has tried to outline a system of the mammals. It is called *Idea institutionum trichozoologiae* and was composed ere he left for England in 1734. It is mainly based upon the works of previous authors, especially those of JOHN RAY; however, A. shows a great portion of indepen-

dence and also makes use of his own observations. The second manuscript, which is by his own hand, is kept in the British Museum (Sloane 3870) and contains a description of all the fishes found in the Baltic and in the Swedish lakes and streams. It appears to be an extract from his magnum opus and to have been composed after his arrival in England in order to introduce himself to Sir HANS SLOANE and obtain the patronage of this prominent and influential savant. This is the one manuscript by ARTEDI's own hand known to us. It is, however, interesting also from another point of view for it shows certain differences from the great final work. Thus we are able to study the development of ARTEDI's systematic conceptions during his stay in England; and we may also arrive at certain conclusions concerning the alterations and additions made by LINNAEUS while editing the *Ichthyologia*."

Sernander, Rutger. LINNÉS dalaresor ett 200-årsminne. *Svenska Linné-Sällskapets Årsskrift* 17, VII-XII (English synopsis on p. 138), Uppsala, 1934. ISIS

" The Year-Book for 1934 opens with a paper by Professor SERNANDER in which he reminds us of the bicentenary of LINNAEUS's journeys through Dalecarlia and underlines the great importance of his connections with Falun, the capital town of this province. Already when, at the New Year of 1734, he visited one of his fellow students at Falun he was introduced to the people working the famous copper-mine and to the Governor of the province, NILS REUTERHOLM, and came into vivid contact with them. He also made use of the opportunity for studying the new methods practised at the mines and kilns and composed a description of them called *Iter ad fodinas et officinas metallicas Westmanniae et Dalekarliae*. However important were these researches REUTERHOLM, who greatly admired his journey through Lapponia, gave him a still more important commission, viz. to make a tour, during the summer of 1734, through all Dalecarlia in order to make wholesale observations of its natural and economic conditions, etc. This invitation reached LINNAEUS at a time when he felt much depressed by obstacles put in his way at the University. He started on his journey, the expenses of which were paid by REUTERHOLM, on July 3d, 1734, and was accompanied by nine of his pupils and friends. The chief results were laid down in the *Iter Dalekarlicum*, a diary of the journey, and in the *Flora Dalekarlica*. Neither of these works was printed during LINNAEUS's life-time—as a matter of fact they were not seen through the press until late in the 19th century. Professor SERNANDER suggests that the reason for this was the result of the botanical researches that did not seem satisfactory to LINNAEUS. According to his theories the North of Dalecarlia ought to supply us with a much more luxurious alpine flora than does inhospitable Lapponia; however, Northern Dalecarlia proved to be decidedly poorer in the number of species."

Stejneger, Leonhard. An early account of BERING's voyages. *Geographical Review* 24, 638-42, 1934. ISIS

Uggla, Arvid Hj. Några Linné-fynd i Uppländska gårdsarkiv. Till kännedomen om LINNÉS förbindelse med handelshusen GRILL och

ARFWEDSON. *Svenska Linné-Sällskapets Årsskrift* 17, 27-34, 1 port., Uppsala, 1934. ISIS

" Letters from and to LINNAEUS... which... throw light upon his connections with the heads of two of the greatest Swedish firms of his time, CARLOS & CLAËS GRILL and A. & J. ARFWEDSON. Through the intervention of these influential persons LINNAEUS often succeeded in importing animals and plants from distant lands and in sending his pupils to different parts of the world."

D. — *Medical sciences*

Blank, Margarete. Eine Krankengeschichte HERMAN BOERHAAVES und ihre Stellung in der Geschichte der Klinik. *Sudhoffs Archiv für Geschichte der Medizin* 27, 51-86, 1934. ISIS

Faucci, Ugo. Contributo alla storia della " Dottrina parassitaria delle infezioni." Sua connessione colla scoperta dell " Origine acarica della scabbia." *Rivista di storia delle scienze mediche* 25, 27-70, 1934. ISIS

Deals mainly with the *Nuova idea del male contagioso de' buoi* of CARLO FRANCESCO COGROSSI (1682-1769). G. S.

Ferran, Côme. A propos de la cérémonie de la confection de la thériaque à l'hôtel de ville de Lyon sous LOUIS XIV. *Bull. de la société franç. d'hist. de la méd.*, 28, 166-73, 1934. ISIS

Garrison, Fielding H. Medicine in the Tatler, Spectator and Guardian. *Bulletin of the Institute of the History of Medicine* 2, 477-513 (Supplement to the *Bulletin of the Johns Hopkins Hospital* 55), 1934. ISIS

Klebs, Arnold C. Die variolation im achtzehnten Jahrhundert. Ein historischer Beitrag zur Immunitätsforschung. 78 p. (Zur historischen Biologie der Krankheitserreger, Materialien, Studien und Abhandlungen, 7). Giessen, 1914. ISIS

Standard memoir on the subject. G. S.

Lefanu, W. R. Four letters from BOERHAAVE. *Janus* 38, 70-76, 1934. ISIS

Lewinson, Minna. AESCULAPIUS among the Augustans. *Annals of medical history* 6, 521-28, 1934. ISIS

Apropos of the literary efforts of medical men of the " Augustan Age." M. C. W.

Mignon, Maurice. La théorie des Esprits Animaux exposée dans un manuscrit anonyme du XVIII[e] siècle. Commentaires sur l'évolution des idées concernant cette théorie et le problème vital. *Bull. de la soc. franç. d'hist. de la méd.* 28, 5-26, 1934. ISIS

The author might possibly be BOISSIER DE SAUVAGES (1706-67), professor in Montpellier. G. S.

Pfaffendorf, E. Barbierwesen um 1700 in Preussen. *Janus* 38, 107-14, 1934. ISIS

Rivero, Rodríguez. Datos sobre el estado de nuestra cirurgía en el siglo XVIII. *Archivos de Historia Médica de Venezuela* 1, 73-86, 1934. ISIS

Schaper, Karl. GIOVANNI BATTISTA MORGAGNI und seine pathologischen Ergebnisse an Mund- und Zahnleiden. (Inaug. Diss.) Institut für Geschichte der Medizin an der Universität Leipzig, 24 p., 1934. ISIS

E. — *Alia*

Dahlgren, E. W. Svenska Vetenskapsakademiens Protokoll för åren 1739, 1740, och 1741. Med anmärkningar utgifna. Vol. 1 : Protokoll och grundregler ; Vol. 2 : Anmärkningar och register. VII+381 p. ; 176 p. Stockholm, ALMQVIST and WIKSELL, 1918. ISIS

Minutes, records, and regulations of the Swedish Academy of Sciences, for the years 1739-1741. Elaborate and very convenient index, see, e.g., LINNAEUS, POLHELM, SWEDENBORG. G. S.

Forti, Umberto. GIORGIO BERKELEY. 17 p. Rome, La Bilancia, 1923. ISIS

Hume, David. Saggi morali, letterari e autobiografia. Prefazione e traduzione a cura di UMBERTO FORTI. 229 p. (Cultura dell' anima). Lanciano, CARABBA, 1930 (L. 5). ISIS

Iorga, Nicolae. DIMITRIE CANTEMIR. *Cultura* 1, 2-11, illus., Cluj, 1924. ISIS

" DIMITRIE CANTEMIR, mort il y a eu deux siècles cette année, a été de son temps le seul érudit qui connût les trois civilisations engendrées par l'humanité : antique, occidentale, et orientale. Fils de prince régnant, il a eu une heureuse éducation. Son principal maître a été JÉRÉMIE CACAVELA, d'origine crêtoise. Or, dans l'île de Crête deux civilisations s'étaient fondues,

celle de l'Occident italien, et celle de l'Orient byzantin. Ainsi s'expliquent quelques uns des caractères de l'œuvre de CANTEMIR : la liberté qui se mêle à son érudition, son goût pour les récits, ses tendances à la philosophie. Un des principaux mérites de CANTEMIR est qu'il nous a donné, dans sa *Description de la Moldavie*, le premier ouvrage géographique conçu dans l'esprit moderne; à côté de la description physique du pays, il note tout ce qui concerne la vie du peuple, ses coutumes, ses superstitions, sa religion, son organisation politique. Les connaissances qu'il avait acquises en Turquie lui permirent d'écrire plus tard son *Historia incrementorum atque decrementorum aulae ottomanicae* (1713). Par cette œuvre, il affirmait, vingt ans avant MONTESQUIEU, une conception philosophique de l'histoire, appliquée à l'évolution d'un grand empire. Sa longue expérience de la vie a fait aussi de CANTEMIR un sage, dont les réflexions restent actuelles : on les lit comme les sentences d'un vieillard."

Jessop, T. E. A bibliography of GEORGE BERKELEY. With an inventory of BERKELEY's manuscript remains by A. A. LUCE. XVI+99 p. Oxford, University Press, 114 Fifth Ave., N. Y., 1934 ($3.25). ISIS

This is not simply a bibliography, but a very convevient guide to the study of BERKELEY's life and thought. Though his fame is based on his metaphysical achievements, many of his writings are of direct concern to the historian of science; 'above all *The analyst* (1734) which is a most interesting document for the history of mathematical thought in the early age of the infinitesimal calculus. The list of BERKELEY mss. kept in the British Museum and in Dublin, will be particularly precious. There is also a list of extant autograph letters which is astonishingly short. G. S.

Metzger, Hélène. La littérature scientifique française au XVIII[e] siècle. *Archeion* 16, 11-17, 1934. ISIS

Very, Frank Washington (1852-1927). A prevision of scientific progress; being a scientific estimate of SWEDENBORG's *Principia*, or, *The first principles of natural things* (1734). 84 p., 2 pl. Boston, WHITTEMORE, 1914. ISIS

Very, Frank Washington. (1852-1927). An epitome of SWEDENBORG's science. 2 vols. : 640 p., 395 p., 15 fig. Boston, Four Seas Co., 1927. ISIS

This survey of SWEDENBORG's scientific thought deserves to be quoted *faute de mieux*, for it will be useful in spite of the lack of an index. Of course what we need is a similar survey made without any bias by a man having a deeper knowledge of the history of science than the author had. The very fact that he tried to establish too many comparisons between Swedenborgian views and the most modern physical theories speaks against him, for those theories are valuable only to the extent that they are the fruits of sound experimental and logical methods. However he made a serious effort to be as critical as possible, and his book might have been considerably worse.

The subject is divided as follows: Introduction 1. Creation by influx; 2. The three atmospheres of the natural world; 3. "Bullular hypothesis"; 4. Hypothesis of elementary vortex-particles and modern atomic theory; 5. Doctrine of a similarity between greatest things and least; 6. Doctrine of heat and light; 7. Psychical phenomena; 8. S. as metallurgist, chemist, and geologist; 9. Doctrine of forms; 10. Origin of the solar system; 11. Theory of the starry heavens; 12. Planetary theory; 13. Correspondences; 14. Egypt; 15. The anatomist; 16. Order, series, and degrees; 17. Doctrine of the grand man. Addendum. "An important incident—One of S.'s memorable relations wherein he was permitted to instruct the angels. Essence and omnipresence of God. The Hahnemannian principle."

The author was an astronomer, meteorologist, astrophysicist who published many technical papers. His book was distributed by The Swedenborg Foundation. G. S.

XVIIIth Century (second half)

A. — *Mathematics*

Jelitai, Josef v. SIPOS PÁL egy kézirata és a kochleoid. *Matematikai és Fizikai Lapok*, 41, 45-54, Budapest, 1933. ISIS

On a MS. of SIPOS and the cochleoid. Apropos of a Latin MS., Tractatus de conicis sectionibus geometrice explanatis auctore PAULO SIPOS transilvano, Frankfurt a.D. 1792. Contribution to the history of the cochleoid. PAUL SIPOS (1759-1816), was the first original Hungarian mathematician. G. S.

B. — *Physical sciences and technology*

Bologa, Valeriu L. Note concernant ANDRÉ ETIENNE. *Société des Naturalistes Luxembourgeois, Bul. mens.* 22, 29-32, 1928. ISIS

Cet ANDRÉ ETIENNE qui était professeur de chimie métallurgique en Transylvanie fit paraître à Cluj en 1795 un traité de chimie *Elementa chymiae metallurgicae... juxta Lavoisieri systhema concinata ac propriis experimentis comprobata...*" L'existence d'un tel livre en Transylvanie dès 1795 est fort remarquable. L'auteur nous donne la table de matières de ce petit livre (128 p.) mais ne nous dit rien sur l'auteur. On voudrait être mieux renseigné à son égard. G. S.

D'Ocagne, Maurice. Un inventeur oublié, NICOLAS JACQUES CONTÉ (1755-1805). *Revue des deux mondes*, 912-24, 15 août, 1934. ISIS

Kockum, Axel. Farmaceutiska afdelningen rum 113-114. Vägledning Utarbetad af KARL AHLBERG och AXEL KOCKUM. Medicinalia från CARL WILHELM SCHEELES apotek. 68 p., 34 fig. (Nordiska Museet). Stockholm, NORSTEDT, 1916. ISIS

Lemay, P. Généalogie — Blason — ex Libris — Cachets de LAVOISIER.

Bull. de la société franç. d'histoire de la médecine 28, 194-98, 1934. ISIS

Lemay, P. Les habitations de LAVOISIER. *Bull. de la société franç. d'hist. de la méd.* 28, 156-60, 1934. ISIS

Lemay, P. LAVOISIER — iconographie française. *Bull. de la société franç. d'hist. de la méd.* 28, 146-50, 1934. ISIS

Nasmith, Frank. RICHARD ARKWRIGHT (1732-1792). *Transactions of the Newcomen Society* 13, 51-53, 1932-33. ISIS

Abstract of a lecture delivered at the Science Museum, London, Dec. 14th, 1932.

Quintana y Marí, Antonio. ANTONIÓ DE MARTÍ y FRANQUÉS (MARTÍ D'ARDENYA): Químico y botánico catalán del siglo XVIII. *Archeion* 16, 38-51, 1 fig., 1934. ISIS

Seydl, Otto. Zpráva o knihovně Dr. ANTONÍNA STRNADA, Královského astronoma a ředitele Pražské Hvězdárny (1746-1799). *Zvláštní otisk ze Slovanské knihovědy* 3, 8 p., 1934. ISIS

A brief report on the library of ANTHONY STRNAD (1746-1799), Royal astronomer, Director of the Observatory, and professor at the Charles University, Praha. The library, now owned by the Convent of Strahov, contains many valuable works on astronomy, mathematics and physics. M. C. W.

C. — *Natural sciences*

Adams, Frank D. The Scottish school of geology. *Science* 80, 365-68, 1934. ISIS

Roule, Louis. DAUBENTON et l'exploitation de la nature. 246 p. Paris, FLAMMARION, 1925. ISIS

LOUIS JEAN-MARIE DAUBENTON (1716-1799), a Burgundian born at Montbard, the birthplace of BUFFON, was trained as a physician, later becoming associated with his fellow townsman as the author of the mammalian anatomical details of the latter's *Histoire naturelle*. Called to the Jardin des Plantes in 1742 he was made custodian of the collections in natural history and demonstrator in anatomy, and remained throughout his life in the service of that institution, with the title of professor when the Jardin became the Museum in 1793. He methodically and studiously applied himself to instruction, to building up the anatomical collections of the enlarging museum, and to the zootechnical interests of his native land. In his later years he transferred his interests to mineralogy. It is difficult to justify his inclusion in Professor ROULE's series of the "Grands naturalistes français". His

anatomical researches never rose to the level of synthesis. His *Catéchisme des Bergers* (1782) went through three editions and as many translations. As a pioneer in the field of animal industry he is significant, but as science this work is comparable to that of the many government-fostered Agricultural Experiment Stations in the earlier years of their work. DAUBENTON belongs to the class of plodding accumulators of museum specimens and unrelated data, unillumined by a scintilla of biological insight as to the meaning of their dreary catalogues. The book is valuable as a resumé of the history of the great Museum of Natural History of Paris. C. A. K.

Schmid, Günther. GOETHES Metamorphosen-Elegie und Neuenhahn der jüngere von Nordhausen. *Thüringisch-Sächsische Zeitschrift f. Geschichte und Kunst*, 22, 92-105, 1933 (1934). ISIS

Stenström, Fritz. ENGELBERT JÖRLIN. Ännu ett blad i Linneanernas historia. *Svenska Linné-Sällskapets Årsskrift* 16, 1-30, 3 fig., 1933. ISIS

" ENGELBERT JÖRLIN (1732-1810) was a peasant's son from Bohuslän and got the opportunity of devoting himself to studies through the patronage of GEORGE WALLIN jr., the learned bishop of Gothenburg. In Upsala he attended the lectures of LINNAEUS and afterwards in vain tried, through the recommendations of BURMANNUS Sr. & Jr., the Dutch friends of L., to obtain leave to pursue his botanical researches at the Cape of Good Hope. He finally was appointed reader of botanics in the University of Lund. There his efforts chiefly were applied to raising fodder crops, suited to the climatic conditions of Sweden."

Uggla, Arvid Hj. En isländsk resenär på besök hos LINNÉ 1772. Meddelande vid Svenska Linnésällskapets sammankomst den 28 november 1932. *Svenska Linné-Sällskapets Årsskrift* 16, 121-24, 1933. ISIS

" Description of LINNAEUS found in an unpublished diary from the year 1772 written by the Icelander HANNES FINNSON (1739-1796), who died as bishop of Skálholt in his native island. "

D. — *Medical sciences*

Bologa, Valeriu. IOAN MOLNÁR-PIUARIU, le premier médecin titré roumain comme auteur médical (In Rumanian). Extras din *Clujul Medical*, no. 5-6, 16 p. ISIS

" L'auteur montre que PIUARIU a été le premier médecin roumain qui ait publié des travaux medicaux. Son premier travail médical, découvert par l'auteur, date de 1793 et marque le commencement de la science médicale roumaine."

Bologa, Valeriu L. Nouvelles données sur IOAN MOLNÁR-PIUARIU

(1741-1816) comme auteur médical. *Retipărire din Transilvania* no. 2, 7 p., 1926. ISIS

Brim, Charles J. BENJAMIN WATERHOUSE (1754-1846). An underestimated American medical pioneer. *Medical Life* 41, 277-301, 1 fig., 1934. ISIS

Jones, Claude. TOBIAS SMOLLETT (1721-71) on the "Separation of the pubic joint in pregnancy". *Medical Life* 41, 302-05, 1934. ISIS

A little known medical work of the novelist-physician. M. C. W.

Leibbrand, Werner. AUGUST VON KOTZEBUE und die Ärzte. Aus dem Berliner Institut für Geschichte der Medizin. *Die medizinische Welt* 8, 8 p., 1934. ISIS

Mauclaire, Prof. Manuscrits concernant le Pr. CHAUSSIER (1746-1828). *Bull. de la société franç. d'hist. de la médecine* 28, 235-44, 1934. ISIS

Nesbit, Louis. The tragedy of senescence as portrayed in SCHNITZLER's *Casanovas Heimfahrt*. *Medical Life* 41, 306-12, 1934. ISIS

CASANOVA (1725-1798, or 1803?). "SCHNITZLER's interest in CASANOVA can well be understood because CASANOVA was originally intended for the medical profession. As his 'Memoirs' show, CASANOVA retained throughout life his interest in medicine, as is shown by his descriptions of disease, his criticism of doctors, his dogmatic opinions on medical subjects, his successful simulation of various maladies and his incursions into the field of therapeutics."

Pincherle, Bruno. Specifici e ricette di CAGLIOSTRO. *Atti della società italiana di storia delle scienze mediche e naturali*, 171-72, Rome, 1933. ISIS

CAGLIOSTRO, i.e. Giuseppe Bàlsamo, 1743-1795.

Scalinci, Noè. I meriti di ANTONIO SCARPA nel campo della oftalmologia. 36 p. *Annali di ottalmologia e clinica ocultistica* 2, fasc. 9, 1933. ISIS

Scalinci, Noè. I meriti di ANTONIO SCARPA nel campo della oftalmologia. *Atti della Società italiana di storia delle scienze mediche e naturali*, IV Congresso Nazionale, Rome, 1933. p. 197-99, 1934. ISIS

Sigerist, Henry E. FAUST in America. *Medical Life* 41, 194-207, 5 fig., 1934. ISIS

Apropos of BERNHARD CHRISTOPH FAUST (1755-1842), whose *Gesundheits-*

Katechism (Bückeburg, 1794) won him an international reputation. American edition, New York, 1798. G. S.

Sigerist, Henry E. On some further editions of FAUST's "Catechism of health." *Bull. of the Institute of the hist. of medicine* 2, 392-401, 4 fig., 1934. ISIS

Terson, A. Quelques remarques de RÉTIF sur le médecin, le chirurgien et l'oculiste. *Bull. de la société franç. d'hist. de la méd.* 28, 161-65, 1934. ISIS

A propos du romancier RESTIF DE LA BRETONNE (1734-1806).

Weinberger, Bernhard Wolf. GEORGE WASHINGTON's dentures. *Dental Survey*, 4 fig., 1934. ISIS

Weinberger, Bernhard Wolf. JEAN PIERRE LE MAYEUR in America—no longer the man of mystery (1781-1789 in America). *The Dental Cosmos*, 569-78, 1934. ISIS

A pioneer surgeon-dentist.

E. — *Alia*

Brett, G. S. GOETHE's place in the history of science. *The University of Toronto Quarterly*, 279-99, 1932. ISIS

Urquijo, Julio de. Los amigos del país (según cartas y otros documentos inéditos del XVIII). 104 p., 6 ills. San Sebastián, Imprenta de la Diputación de Guipúzcoa, 1929. ISIS

This monograph, which was originally published in the *Revista Internacional de los Estudios Vascos*, contains many unpublished letters and other valuable documents relating to the Count of Peñaflorida, who founded in 1764 the Basque Society of Friends of their Country, and to his son, RAMÓN MARÍA DE MUNIBE, who visited the important scientific and industrial centers of France, Belgium, the Netherlands, Denmark, Sweden, Germany, Austria, and Italy. The object of this Society was "... to cultivate the inclination and taste of the Basque nation for the sciences, literature, and the fine arts; to correct and polish its customs; to banish idleness, ignorance, and their lamentable consequences; and to unite more closely the three Basque provinces of Álava, Vizcaya, and Guipúzcoa." This book can be heartily recommended to all who are interested in the scientific culture of eighteenth-century Spain. M. E. W.

XIXth Century (whole and first half)

A. — *Mathematics*

Hamilton, W. R. Abhandlungen zur Strahlenoptik. Übersetzt und

mit Anmerkungen hrsg. von GEORG PRANGE. VIII+429 p.+117, 43 fig. Leipzig, Akademische Verlagsgesellschaft, 1934. ISIS

Miner, John R. PIERRE-FRANÇOIS VERHULST (1804-49), the discoverer of the logistic curve. *Human biology* 5, 673-89, 1 fig., 1933. ISIS

Translation of QUETELET's obituary (1850) with portrait, preface, and notes. VERHULST's discovery of the familiar S-shaped curve, bounded by upper and lower asymptotes, representing the growth of a population, and named by him "logistic curve," was generally forgotten until after the independent rediscovery of the same function by R. PEARL and L. J. READ in 1920. G. S.

B. — *Physical sciences and technology*

Elhuyar, Fausto de. El primer centenario de D. FAUSTO DE ELHUYAR. *Anales de la Sociedad Española de Física y Química* 31, 115-43, 1933. ISIS

An illustrated pamphlet containing addresses delivered by Señores BERMEJO, HAUSER, GÁLVEZ-CAÑERO, MOLES, NOVO, and LÓPEZ SÁNCHEZ AVECILLA to commemorate ELHUYAR's services to chemistry, mineralogy, metallurgy, and mining. M. E. W.

Faraday, Michael. FARADAY's diary. Being the various philosophical notes of experimental investigation made by MICHAEL FARADAY, D.C.L., F.R.S. during the years 1820-1862 and bequeathed by him to the Royal Institution of Great Britain. Now, by order of the managers, printed and published for the first time, under the editorial supervision of THOMAS MARTIN. With a foreword by Sir WILLIAM H. BRAGG. Vol. V, Sept. 6, 1847-Oct. 17, 1851. XIII+456 p., 2 pl. London, BELL, 1934 (12 guineas per set of 7 vols.). ISIS

The publication of this diary continues in the best manner and there is not much we can add to our reviews of vols. I-IV (*Isis* 20, 472-4; 22, 252-3). Let us hope that the editor will add indices to the last volume, for these will be absolutely indispensable, and the publication would lose much of its value and serviceability without them. G. S.

Gálvez-Cañero, A. de. Apuntes biográficos de D. FAUSTO DE ELHUYAR Y DE ZUBICE. 253 p., ill. (*Boletín del Instituto Geológico y Minero de España*, 53). Madrid, Gráficas Reunidas, 1933. ISIS

This delightful biography of ELHUYAR was published to commemorate the centenary of his death. It traces from original sources his early studies under A. G. WERNER and TORBERN BERGMAN; his researches with his brother, D. JUAN JOSÉ, which culminated in the isolation of tungsten; his services to the Basque Society of Friends of Their Country; his extended travels in Austria and Hungary while studying Baron BORN's amalgamation process

of working silver ores; his thirty-three years as first director of the School of Mines of Mexico; his relations with ALEXANDER VON HUMBOLDT and A. M. DEL RÍO; and his closing years as General Director of Mines of Spain. The book contains a wealth of new material, is superbly illustrated, and has a useful bibliography. The author has brought forth a worthy tribute to this great Spanish scientist who contributed so much to the chemical and mining industries of both hemispheres. M. E. W.

Gordon, W. T. WILLIAM HYDE WOLLASTON, F.R.S. (1766-1828). *Nature* 134, 86-87, 1934. ISIS

Hartmann, Ludwig. Unveröffentlichte Briefe des Physikers JEAN-BAPTISTE BIOT (1774-1862). Neue Beiträge zur Geschichte seines Lebens und seiner wissenschaftlichen Arbeiten. *Archeion* 16, 52-72, 1934. ISIS

Holmberg, Arne. Bibliographie de J. J. BERZELIUS. Publiée au nom de l'Académie Royale des Sciences de Suède. Première partie. Ouvrages imprimés. XII+152 p. Stockholm, 1933. ISIS

It will suffice to indicate this very elaborate bibliography the importance of which is obvious. The learned librarian of the Royal Swedish Academy has taken infinite pains to insure its completeness and accuracy. Let us hope that the necessary indices will be added later. G. S.

Jenkins, Rhys. A Cornish engineer: ARTHUR WOOLF, 1766-1837. *Transactions of the Newcomen Society* 13, 55-73, 1932-33. ISIS

Lee, Charles E. Centenary of the London motor omnibus. *Transactions of the Newcomen Society* 13, 131-38, 1932-33. ISIS

Lippmann, Edmund O. von. War Fürst BISMARCK Rübenzucker-Fabrikant? *Die Deutsche Zuckerindustrie* 32, 1 p., 1934. ISIS

Marshall, C. F. Dendy. Motor omnibuses a century ago. *Transactions of the Newcomen Society* 13, 139-45, 3 fig., 1932-33. ISIS

Pendred, L. St.-L. RICHARD TREVITHICK, a eulogy. *Transactions of the Newcomen Society* 13, 183-86, 1932-33. ISIS

Testi, Gino. Nel centenario della macchina da scrivere. *Archeion* 16, 98-99, 1934. ISIS

C. — *Natural sciences*

Englert, Ludwig. OKEN und die Versammlungen Deutscher Naturforscher und Ärzte. *Medizinische Klinik* 37, 4 p., 1934. ISIS

Gilbert, E. W. The exploration of Western America, 1800-1850. An historical geography. XVI+233 p., 31 fig., 3 maps. Cambridge, University Press, 1933. ($3.75). ISIS

The influence of THOMAS JEFFERSON is today nowhere more profoundly important than in the results of his interest in the scientific exploration of the then unknown western part of what is now the United States. To him we owe both the initiation and carrying out of the early expeditions into this territory which resulted in correct cartography, authentic records of the fauna and flora, some accurate accounts of the aboriginal Indian tribes, and the discovery of routes for further exploration as well as of later migration and settlement. Mr. GILBERT's book is a scholarly account of the geographical setting in which the explorers of this vast domain accomplished their work and an estimate of the influence of the various environmental factors on the course and history of geographical exploration of the Far West. The factors of physiography, climate, fauna, flora, and aborigines are included in these estimates. Special attention is given to the expeditions of LEWIS and CLARK, LONG and BELL, PIKE, and FREMONT; to the explorations of the furtrading companies; and to the opening up of the transcontinental trails. A representative selection of maps showing the progress of discovery is included, as well as an ample bibliography and index. C. A. K.

Neave, S. A.; Griffin, F. J. The history of the Entomological Society of London, 1833-1933. XLVI+244 p. London, Royal Entomological Society, 1933. ISIS

Reviewed in *Natural History Magazine* 4, 147-48, 1933.

Studnička, F. K. Die Grundlagen der Zellenlehre von THEODOR SCHWANN. *Histologisch-embryologischen Institut der Masaryk-Universität in Brünn* 78, 209-88, 1934. ISIS

Wittich, Ernst. ALEXANDER V. HUMBOLDTS Expeditionen in Mexiko. *Klinische Wochenschrift* 13, 19 p., 1934. ISIS

D. — *Medical sciences*

Bologa, V. L. Un livre allemand inconnu sur la peste de Bucarest en 1813. (In Rumanian). Extras din *Clujul Medical*, no. 3-4, 2 p., Martie-Aprilie, 1927. ISIS

Bologa, V. L. G. C. ROJA (1789-1847), un savant médecin macédo-roumain de Timişoara. Extras din *A Revistei Viata Medicala*, no. 2, 4 p., 1928. ISIS

Bologa, Valeriu L.; Baclajanschii, Alex. Données médico-historiques roumaines-russes (Sur la peste de 1828-30 en Moldavie).

(In Rumanian). Extras din *Clujul Medical* no. 3, 8 p., 1 Martie 1930. ISIS

I. Contribution bibliographique à l'histoire de la médecine en Bessarabie et à l'histoire des épidémies dans les armées russes qui occupèrent les Principautés en 1829. II. Trois billets de quarantaine romano-russes de 1829-30.

Bologa, Valeriu L. Les eaux minérales connues en Valachie en 1832 (in Rumanian). Extras din *Clujul Medical* no. 1, 4 p., 1930. ISIS

Bologa, Valeriu L. Sur les Roumains de Macédoine en Autriche au début du siècle passé (in Rumanian). Extras din *Anuarul Institutului ed Istorie Nationala* V, 503-12, Cluj, 1930. ISIS

De Haas, J. H. BRETONNEAU (1776-1862) en de eerste (Fransche) literatuur over dothinentérie bij kinderen. *Bijdragen tot de geschiedenis der geneeskunde* 14, 167-85, 1934. ISIS

Dominguez, Rafael. Un cuestionario medico. *Archivos de Historia Médica de Venezuela* 1, 120-25, 1934. ISIS

Series of medical questions sent by the Royal College of Physicians of London in 1830 to Caracas with contemporary answers. G. S.

Evans, B. Ifor. KEATS as a medical student. London, *Times Literary Supplement*, p. 391, May 31, 1934. ISIS

Forman, Jonathan. The first cholera epidemic in Columbus, Ohio (1833). *Annals of Medical History* 6, 410-26, 1934. ISIS

Gheorghiu, Constantin. Le docteur EPISCOPESCU (début du XIX^{e} S.) et les débuts de la littér. médicale roumaine (in Rumanian). Extras din *Clujul Medical*, no. 1, 12 p., 1 Jan. 1934. ISIS

Gomez, Antonio. Una epidemia de fiebre en Maracay en 1808. Observaciones sobre la epidemia de calenturas que reinaron en los Valles de Aragua en el año de 1808. *Archivos de Historia Médica de Venezuela* 1, 87-97, 1934. ISIS

King, R. W. KEATS as a medical student. London, *Times Literary Supplement*, p. 443, 1934. ISIS

McCarty, Arthur Clayton. Dr. WALTER BRASHEAR (1776-1860). *Annals of Medical History* 6, 301-06, 1934. ISIS

A pioneer-surgeon of Kentucky.

Neuburger, Max. Masters of the Vienna clinic in the nineteenth century. *Medical life* 41, 208-22, 1 port., 1934. ISIS

Pitfield, Robert L. THOMAS HOLLEY CHIVERS, M.D. "The wild MAZEPPA of letters". *Annals of Medical History* 6, 241-54, 1934. ISIS

Rodríguez, Rivero. El Doctor CARLOS ARVELO. Un interesante estudio suyo sobre las fiebres de Aragua, en 1808. *Archivos de Historia Médica de Venezuela* 1, 109-19, 1934. ISIS

Including "Memoria del Br. Dn. CARLOS ARVELO sobre la fiebre intermitente que ha reynado en los Valles de Aragua desde mayo hasta octubre de 1808".

Spallicci, Aldo. PAOLO ASSALINI (il chirurgo di NAPOLEONE) n. Reggio E. 15 Gennaio 1759-Capodimonte 17 Novembre 1846. *Atti della Società italiana di storia delle scienze mediche e naturali* 173-95, 4 fig., Rome, 1933. ISIS

E. — *Alia*

Böhne, Nelly. Nationale und sozialpolitische Regungen auf den Versammlungen Deutscher Naturforscher und Ärzte bis zum Revolutionsjahr 1848. *Sudhoffs Archiv für Geschichte der Medizin* 27, 87-130, 1934. ISIS

Bologa, V. L. Le 90ème anniversaire de la Société des médecins et naturalistes de Jassy. *Cultura* 1, 392-93, Cluj, 1924. ISIS

Bologa, V. L. Informations étrangères sur les débuts de la vie scientifique et médicale roumaines en Moldavie (Début du XIX^{e} siècle). (In Rumanian). Extras din *Revista ştiinţifică V. Adamache*, no. 4, 7 p., Octombrie, Iasi, 1927. ISIS

Deltheil, A. Quelques caractères essentiels de l'évolution des sciences depuis un siècle. *Rev. Sc.*, 71, 132-34, 1933. ISIS

Harrington, John P. A new original version of BOSCANA's historical account of the San Juan Capistrano Indians of Southern California. *Smithsonian Miscellaneous Collections* 92, 62 p., 2 pl. Washington, 1934. ISIS

BOSCANA (1776-1831), a Catalan Franciscan sent as a missionary to Mexico and California. M. C. W.

XIXth Century (second half)

A. — *Mathematics*

Cantor, Georg. Gesammelte Abhandlungen. Edited by E. ZERMELO. VII+486 p. Berlin, SPRINGER, 1932. ISIS

Reviewed by D. M. WRINCH, *Mathematical Gazette* 17, 332-33, 1933. "Contains a reprint of CANTOR's most important papers, a selection from the correspondence of CANTOR and DEDEKIND, and a life of CANTOR (1845-1918) by FRAENKEL. C. W. A.

Chazy, Jean. L'œuvre mathématique de PAINLEVÉ. *Mathematica* 8, 201-11, Cluj, 1934. ISIS

Ginsburg, Jekuthiel. A hitherto unpublished letter by BENJAMIN PEIRCE. *Scripta mathematica* 2, 278-82, facs., 1934. ISIS

Apropos of the first (lithographic, 100 copy) edition of B. PEIRCE's *Linear associative algebra*, 1870. Letter to GEORGE BANCROFT. G. S.

Hobson, Ernest William. (1856-1933). *Nature* 133, 938-39, 1934. ISIS

Keyser, Cassius Jackson. WILLIAM BENJAMIN SMITH (1850-1934). *Scripta mathematica* 2, 305-11, 1934. ISIS

Loria, Gino. A. MANNHEIM (1831-1906)—soldier and mathematician. *Scripta mathematica* 2, 337-42, 1934. ISIS

Vasconcelos, Fernando de Almeida e. DANIEL AUGUSTO DA SILVA (1814-1878) et la constitution de l'Astatique. Une priorité des sciences mathématiques portugaises. *Archeion* 16, 73-92, 1934. ISIS

Vetter, Quido. Vládní rada LADISLAV ČERVENKA šedesátníkem. *Časopis pro pěstování matematiky a fysiky*, ročnik 63, sešit 6, D33-D41, 2 fig., Praze 1934. ISIS

B. — *Physical sciences and technology*

Davis, Tenney L. SAMUEL PARSONS MULLIKEN. *Industrial and Engineering Chemistry* 12, 197, 1934. ISIS

Ferguson, Allan. From log cabin to Royal Observatory. *Nature* 134, 520-21, 1934. ISIS

Apropos of JOHANN VON LAMONT (1805-79) astronomer royal of Bavaria, born at Coniemulzie near Aberdeen. G. S.

Froude, William (1810-1879) and experimental tanks. *Nature* 134, 111, 1934. ISIS

Furness, Caroline E. Part I. The longitude of the Vassar College Observatory. Part II. A study of four Be stars, by M. ALBERTA HAWES. 60 p., 10 pl. *Publications of the Vassar College Observatory*, no. 4, Poughkeepsie, N.Y., 1934. ISIS

Historically interesting because it includes the determinations made by MARIA MITCHELL in 1865-77, and two remarkable photographs of her and her father. MARIA MITCHELL (1818-89) was the first professor of astronomy in Vassar College (*Isis* 16, 121). G. S.

Gunther, R. T. J. F. CAMPBELL, 1822-85, and his refracting quadrant. *Nature* 134, 251-52, 1934. ISIS

Kremers, Edward. OTTO WALLACH, his life and work. *The register of Phi Lamda Upsilon*, 18, no. 4, 1933. ISIS

Part of an address delivered at a public meeting of the Wisconsin chapter of Phi Lambda Upsilon. E. K.

Langley, Samuel Pierpont (1834-1906). Obituary in *Nature* 134, 240-42, 1934. ISIS

Ljungberg, Erik Johan. Minnesteckning föredragen på Kungl. Vetenskapsakademiens högtidsdag den 3 april 1923, by K. LANGENSKIÖLD, *Levnadsteckningar över Kungl. Svenska Vetenskapsakademiens Ledamöter* 6, 103-31, port., Stockholm, 1921-32. ISIS

(Lyon). Cinquantenaire de l'Ecole de chimie industrielle de Lyon. 12 mai 1934. 6 p., illus. Ecole de Chimie industrielle de Lyon. ISIS

Menschutkin, B. N. Early history of MENDELÉEFF's periodic law. *Nature* 133, 946, 1934. ISIS

"Thus MENDELÉEFF's periodic table actually antedates his periodic law and received its modern form in 1869, not in 1871."

Nilson, Lars Fredrik. Minnesteckning föredragen på Kungl. Vetenskapsakademiens högtidsdag den 31 mars 1921. By Å. G. EKSTRAND, *Levnadsteckningar över Kungl. Svenska Vetenskapsakademiens Ledamöter* 6, 1-102, port., Stockholm, 1921-32. ISIS

(Nobel, Alfred). ALFRED NOBEL och hans släkt. Minnesskrift utgiven av Nobelstiftelsens styrelse. 328 p., 18 pls. Stockholm, ALMQVIST & WIKSELLS, 1926. ISIS

Sumptuous publication of which I owe a copy to the generosity of the Swedish Academy of Sciences. It includes an account of NOBEL's ancestors beginning with PETRUS OLAI NOBELIUS who flourished in Upsala at the end of the seventeenth century and died in 1707, then of NOBEL's great discoveries, and of his personality. There are many beautiful illustrations including colored portraits and facsimiles of NOBEL's early patents and other documents. G. S.

Parsons, William Barclay (1859-1932). Obituary by J. K. FINCH, *Transactions of the Newcomen Society* 13, 201-02, 1932-33. ISIS

Smith, E. C. JOSHUA FIELD's diary of a tour in 1821 through the Provinces. Part II. With introduction and notes. *Transactions of the Newcomen Society* 13, 15-50, 23 fig., 1932-33. ISIS

Sprague, Frank J. The genesis of the multiple-unit system of electric train control. *Transactions of the Newcomen Society* 13, 117-30, 1932-33. ISIS

Thomson, Sir **Joseph J.** Reminiscences of physics and physicists. *Science* 80, 169-73, 1934. ISIS

C. — *Natural sciences*

Blix, Magnus Gustaf. Minnesteckning föredragen på Kungl. Vetenskapsakademiens högtidsdag den 31 mars 1928. *Levnadsteckningar över Kungl. Svenska Vetenskapsakademiens Ledamöter* 6, 251-80, ports., Stockholm, 1921-32. ISIS

Bologa, Valeriu L. ADOLF BASTIAN (1826-1905). Notă comunicată la Societatea de Etnografie din Cluj (26.II.1926) cu prilejul centenarului său. Extras din *Revista Stiinţifica V. Adamachi*, no. 4, 5 p., August 1926. ISIS

Collins, Frank Shipley (1848-1920). Obituary by WILLIAM ALBERT SETCHELL in *Proceedings of the American Academy of Arts and Sciences* 68, 615-18, 1933. ISIS

(Darwin, Charles). Down House (at Downe, Farnborough, Kent). Here DARWIN thought and worked for forty years and, died 1882.

79 p., illus. British Association for the Advancement of Science (no date). Addenda 6 p., April 1934 (6 d.). ISIS

Description of Down House with brief catalogue of its main treasures. Thanks to the munificence of Sir GEORGE BUCKSTON BROWNE, the house is now a national shrine, the trustees being the B.A.A.S. The secretary of the B.A.A.S. occupies the upper floor as his private residence. I made a pilgrimage to this house on Sept. 19, 1934, with F. S. MARVIN and two young ladies, and was deeply impressed. G. S.

Davis, William Morris (1850-1934). Obituary by DOUGLAS JOHNSON, *Science* 79, 445-49, 1934; and by J. S. G. *Nature* 133, 973-74, 1934. ISIS

Howarth, C. J. R.; Howarth, Eleanor K. A history of DARWIN's parish. Downe, Kent. With a foreword by Sir ARTHUR KEITH. VII+68 p., 1 pl. Southampton, RUSSELL, 1933. ISIS

This booklet presents a detailed history of the parish in which CHARLES DARWIN lived at Down House from 1842 till his death in 1882. It was here that the first draft of the " Origin of species (1842) " and all of his later works were written. The house and grounds were presented to the British Association for the Advancement of Science in 1927 by Sir BUCKSTON BROWNE. This is a history of the town from the earliest times, of DARWIN's neighbors, and of his occupancy and development of the premises. The " worm-stone," on which he made his observations on vegetable mould and earthworms still stands at the edge of the lawn. C. A. K.

Karadja, Constantin I. Un voyage d'études géologiques en Transylvanie en 1862 (in Rumanian). *Cultura* 1, 365-69, Cluj, 1924. ISIS

" Un professeur de Cambridge, DAVID THOMAS ANSTED (1814-80) fit un voyage d'études en Transylvanie, en 1862, dont il publia les résultats scientifiques dans une brochure, intitulée. ' A short trip in Hungary and Transylvahia in the spring of 1862 ' (Londres, ALLEN, 1862)."

Kemp, James Furman (1859-1926). Obituary by FRANK DAWSON ADAMS. 21 p., port. (National Academy of Science, *Biographical memoirs*, vol. 16, first memoir). Washington, D.C., 1934. ISIS

Lilljeborg, Wilhelm. Minnesteckning föredragen på Kungl. Vetenskapsakademiens högtidsdag den 31 mars 1924. By EINAR LÖNNBERG, *Levnadsteckningar över Kungl. Svenska Vetenskapsakademiens Ledamöter* 6, 133-80, port., Stockholm, 1921-32. ISIS

MacBride, E. W. HUXLEY. 143 p. (Great lives, no. 34). London, DUCKWORTH, 1934. ISIS

Professor MACBRIDE'S brief summary of HUXLEY'S life attributes his

eminence more to his Welsh than to his Saxon or Nordic ancestry. As biography it presents admirably and sympathetically an analysis of HUXLEY's personal characteristics and their relationships to his intellectual achievements and public activities. No other biographer of "DARWIN's bulldog" has given so full an analysis of his zoological investigations or assessed their values so critically. A part of the work is given up to a criticism of natural selection and a presentation of the biographer's own views in favor of the transformism of LAMARCK. This in itself is a valuable bit of historical data. Professor MACBRIDE states (p. 52) that HUXLEY "coined the new word 'biology'." This is an oversight of LAMARCK's earlier introduction of the word in his *Philosophie Zoologique*. To HUXLEY justly goes the credit for acclimatizing the word among the English-speaking public through HUXLEY and MARTIN's *General Biology*, which was a juxtaposition of two scientific disciplines rather than a fusion of the common subject matter of the science of life. C. A. K.

Muller, H. J. The views of HAECKEL in the light of genetics. *Philosophy of Science* 1, 313-22, 1934. ISIS

Nordenskiöld, Adolf Erik. Professor och intendent vid naturhistoriska riksmuseets mineralogiska avdelning. Minnesteckning föredragen på Kungl. Vetenskapsakademiens högtidsdag den 31 mars 1925. *Levnadsteckningar över Kungl. Svenska Vetenskapsakademiens Ledamöter* 6, 181-206, ports., Stockholm, 1921-32. ISIS

Richet, Charles. Souvenirs d'un physiologiste. 157 p. Paris, PEYRONNET, 1933. (12 fr.). ISIS

This autobiographic sketch reveals a picturesque and leading figure among French physiologists and a Nobel prize winner. It relates his own discoveries of latent addition, masked HCl in a classic case of gastric fistula, diuretic effect of lactose, serotherapy, electric tetanus, hypnotic chloralose, and anaphylaxis. As bibliographer, editor of the *Revue scientifique* and the great dictionary of physiology, experimental physiologist, aeronaut, metapsychist, dramatist, poet, and pacifist, he was in the forefront of significant movements in French thought for the last half century. C. A. K.

Schmidt, Heinrich. ERNST HAECKEL. Denkmal eines grossen Lebens. VIII+118 p., 15 pl. Jena, *Frommann*, 1934 (RM. 3.80). ISIS

The biography celebrates the centenary of the birth (Feb. 16, 1834) of the foremost German protagonist of evolution. His ancestry, family, life, education, and his work as investigator, Darwinist, monist, teacher, artist, and nationalist are reviewed, his accomplishments summarized, and his bodily and mental characteristics described. Interesting unpublished family and personal portraits are included. C. A. K.

Thaxter, Roland (1858-1932). Obituary by WILLIAM ALBERT SETCHELL in *Proceedings of the American Academy of Arts and Sciences* 68, 679-82, 1933. ISIS

Théel, Hjalmar. Bidrag till Kristinebergs historia. 48 p., 4 pl. (Kristinebergs zoologiska station, 1877-1927. Skriftserie utgiven av. K. Svenska Vetenskapsakademien, Nr. 1). Stockholm, 1928. ISIS

Uexküll, Jakob Johann Baron von. Zu seinem 70. Geburtstage am 8. September 1934. By FRIEDRICH BROCK. *Sudhoffs Arch. für Geschichte der Medizin* 27, 193-212, 1 port., 1934. ISIS

D. — *Medical sciences*

Bick, Estelle C. Sir FRANCIS SEYMOUR HADEN (1818-1910). *Annals of medical history* 6, 475-82, 4 fig., 1934. ISIS

Surgeon and painter-etcher. Founded the Royal Hospital for Incurables in 1850. Was an important leader of the etching movement in England. M. C. W.

Birkhaug, Konrad E. ALBERT LEON CHARLES CALMETTE (1863-1933). *Annals of medical history* 6, 291-300, 3 fig., 1934. ISIS

One of PASTEUR's illustrious pupils. Discoverer of the antivenin serum and the BCG vaccine for the prevention of tuberculosis. M. C. W.

Bologa, V. L. VICTOR BABES (1854-1924). *Cultura* I, 385-86, Cluj, 1924. ISIS

Bologa, Valeriu L. Dr. GHEORGHE CRAINICEANU (1853-1926), historien de la médecine roumaine. Extras din *Clujul Medical* no. 11-12, 8 p., 1926. ISIS

Dock, George. I. DOMINIC JOHN CORRIGAN (1802-1880); his place in the development of our knowledge of cardiac disease. II. The water-hammer pulse. *Annals of medical history* 6, 381-95, 1934. ISIS

Ernst, Paul; Klebs, Arnold C. EDWIN KLEBS, 1834-1913. *Verhandlungen der Deutschen Pathologischen Gesellschaft* 17, 10 p., 1914. ISIS

A brief biographical notice of EDWIN KLEBS by PAUL ERNST and a bibliography of his works by ARNOLD C. KLEBS. M. C. W.

Fox, Herbert. Baron SHIBASABURO KITASATO (d. 1931). *Annals of medical history* 6, 491-99, 1934. ISIS

"Baron of the Japanese Empire, Doctor of Medicine, leader of thought in modern medical life of Japan, most prominent in investigative and practical public health, and a scientific executive."

Gafafer, William M. Bibliographical biography of PETER LUDVIG PANUM (1820-1885), epidemiologist and physiologist. *Bulletin of the Institute of the History of Medicine* 2, 259-80, 2 fig., port., 1934. ISIS

Genty, Maurice. Quelques documents sur la famille et la maison natale de BICHAT. *Bulletin de la société française d'histoire de la médecine* 27, 71-76, 2 illus., 1 facs., 1933. ISIS

Hinsdale, Guy. JOHN JENNINGS MOORMAN, M.D. (1802-1885). A biographical note. *Annals of medical history* 6, 353-58, 1 fig., 1934.

A pioneer in American medical hydrology. ISIS

Key, Axel. Professor i patologisk anatomi vid Karolinska medikokirurgiska institutet. Minnesteckning föredragen på Kungl. Vetenskapsakademiens högtidsdag den 31 mars 1926, by ALLVAR GULLSTRAND. *Levnadsteckningar över Kungl. Svenska Vetenspaksakademiens Ledamöter* 6, 207-31, Stockholm, 1921-32. ISIS

Klauder, Joseph V. Sir JONATHAN HUTCHINSON (1828-1913). *Medical Life* 41, 313-26, port., 1934. ISIS

"HUTCHINSON was pragmatic and was a clinician of the old school. His discoveries were objective and so were the domain in which he excelled—dermatology, ophthalmology, in many ways syphilology, and as a naturalist. In a consistent way he favored charts, drawings and specimens in teaching and in education. He wrote: 'It is necessary to confess, in the first place, that I have for many years worked but little in the postmortem room, and still less in the laboratory'."

MacDermot, H. E. Notes on the early editions of OSLER's textbook of medicine. *Annals of medical history* 6, 224-40, 2 fig., 1934. ISIS

Moorman, Lewis J. Tuberculosis and genius: ROBERT LOUIS STEVENSON (1850-1894). *Annals of medical history* 6, 540-56, 1934. ISIS

Robertson, William Egbert. Physical diagnosis from the time of RÖNTGEN. *Annals of medical history* 6, 255-63, 1934. ISIS

Sabin, Florence Reba. FRANKLIN PAINE MALL, the story of a mind. XIV+342 p., 8 port. Baltimore, Johns Hopkins Press, 1934 ($2.75). ISIS

This is an expansion of the author's memoir on MALL prepared for the National Academy of Sciences, but it deals in less detail with his research and more with the development of his mind, and his influence on medical

science and on medical education. FRANKLIN PAINE MALL, 1862-1917, was of German descent, educated in the Medical School of the University of Michigan, at Heidelberg under WILHELM HIS, and at Leipzig under CARL LUDWIG. Returning to the U.S.A., he was successively Fellow in Pathology at Johns Hopkins Medical School, Adjunct Professor of Anatomy at Clark University, and Professor of Anatomy at Chicago University and at Johns Hopkins Medical School. MALL contributed greatly to the development of standards of research in anatomy in America, to the broadening of its scope along embryological and histological lines, and to linking up the dynamic and structural aspects of the subject. He fostered the expansion of the preparation for medical training, the sound and correlated development of the basic sciences in the preclinical years, and the linkage there with clinical instruction, the establishment of full-time professorships in medical schools, and high standards of illustrations, editorial supervision, and scholarly production in American scientific publications. He was instrumental in the establishment of the *American Journal of Anatomy* and the *Anatomical Record*. C. A. K.

Stevenson, Charles S. A biography of GEORGE HUNTINGTON, M.D. (1850-1916). *Bulletin of the Institute of the History of Medicine* 2, 53-76, 1934. ISIS

Sudhoff, Karl. A celebration of his eightieth birthday. *Bulletin of the Institute of the History of Medicine* 2, 1-25, 2 fig., 1934. ISIS

This number of the *Bulletin* is largely devoted to the celebration of the grand old man's birthday. Articles by HENRY E. SIGERIST, FIELDING H. GARRISON, JOHN RATHBONE OLIVER, and OWSEI TEMKIN celebrating various aspects of SUDHOFF's work and personality. G. S.

Sudhoff, Karl. LUDWIG THUDICHUM (1829-1901). Rettung eines hessischen Gelehrten aus LIEBIGS Schule. *Die Nachrichten der Giessener Hochschulgesellschaft* 9, 33-45, (undated, 1934?). ISIS

Thompson, C. J. S. Lord LISTER, the discoverer of antiseptic surgery. 99 p., 1 pl., 2 port. London, BALE, Sons & DANIELSSON, 1934 (5s.). ISIS

This is a brief biography, giving LISTER's relations to the renaissance of surgery, his letter to PASTEUR, the history of antiseptics, his surgical use of the spray, gauze, and catgut ligature, a list of instruments invented by him, and of his honours, and a guide to the LISTER exhibits in the Museum of the Royal College of Surgeons. C. A. K.

Welch, William Henry. (1850-1934). Obituary by FRIEDRICH MÜLLER; *Münchener Medizinischen Wochenschrift*, 2 p., 1934; by HENRY E. SIGERIST, *Bull. of the Institute of the hist. of medicine* 2, 345-46, 1934; by H. R. VIETS, *New England Journal of Medicine* 210, 1033-34, 1934; by SIMON FLEXNER, *Science* 79, 529-33, 1934. ISIS

E. — *Alia*

Englert, Ludwig. Der deutsche Geist in der Naturforschung und Heilkunde. Rückblick auf die 40. Versammlung deutscher Naturforscher und Ärzte zu Hannover im September 1865. *Die Medizinische Welt* 36, 10 p., 1934. ISIS

Langenskiöld, Karl. Minnesteckning föredragen på Kungl. Vetenskapsakademiens högtidsdag den 31 mars 1927. *Levnadsteckningar över Kungl. Svenska Vetenskapsakademiens Ledamöter* 6, 233-50, Stockholm, 1921-32. ISIS

Senart, Emile. Bibliographie des travaux de EMILE SENART, Président de la Société asiatique (1908-1928), établie par A. GUÉRINOT. *Journal asiatique* 223, fasc. ann., 1-75, 1933 (received in 1934). ISIS

Thompson, D'Arcy Wentworth. Fifty years ago, in the Royal Society of Edinburgh. An address delivered, at the request of the Council on May 7, 1934, in commemoration of the 150th year of the Society. *Proceedings of the Royal Society of Edinburgh* 54, pt. 2, 145-57, 2 pl., 1933-34. Abridged in *Nature* 133, 933-37, 1934. ISIS

XXth Century

A. — *Mathematics*

Sergescu, Pierre. Les sciences mathématiques. 182 p. (Extrait du Tableau du XX^e siècle). Paris, DENOËL et STEELE, 1933. ISIS

Belle synthèse de l'œuvre mathématique du XX^e siècle *en France* (Le titre ne mentionne malheureusement pas cette restriction). Subdivisé comme suit : 1. L'héritage de XIX^e siècle (introduction résumant les mathématiques françaises antérieures au XX^e siècle; 25 p. en tout dont la plupart sont consacrées au XIX^e siècle). 2. HENRI POINCARÉ. 3. Analyse mathématique et théorie des fonctions. 4. Géométrie et astronomie. 5. Mécanique et physique mathématique. 6. Philosophie et histoire. Index bio-bibliographique. (38 mathématiciens). Le chapitre 6 (30) contient : H. POINCARÉ; L'œuvre historique de P. DUHEM; Autres philosophes des mathématiques; Histoire des mathématiques; Œuvres collectives; Cours et traités. Cet ouvrage précieux est orné de plusieurs portraits. G. S.

B. — *Physical sciences and technology*

Bologa, Valeriu L. Un îndrumător : AUREL CIORTEA (physicien

roumain). (1872-9/XI. 1929). Cuvinte în numele foştilor elevi braşoveni. 3 p. (neither place nor date). ISIS

Meldrum, Andrew Norman (1876-1934). Obituary by HÉLÈNE METZGER. *Archeion* 16, 97-98, 1934; and in *Nature* 133, 749, 1934. ISIS

(Rateau, Auguste (1863-1930)). Notices de P. CHALEIL : *La méthode et l'œuvre générale d'A. Rateau*; de E. JOUGUET : *A. Rateau, le savant et le professeur*; de MONTEIL : *A. R., la thermodynamique et les machines motrices*; de JEAN REY : *A. R., turbomachines en général, ventilateurs, compresseurs, pompes rotatives. Mém. et comptes rendus de la Société des ingén. civils*, 83, 902-22, Paris, 1931. ISIS

Rutherford of Nelson, Lord. The new hydrogen. *Science* 80, 21-25, 1934. ISIS

Lecture before the Royal Institution of Great Britain, March 23, 1934.

Wolf, Max (1863-1932). Ein Gedenkblatt. 28 p., 1 port., 13 fig. (*Sitz.-Ber. d. Heidelberger Akademie d. Wiss., Math.-naturwiss. Kl., Abh.* 4, 1933). Berlin, DE GRUYTER, 1933. ISIS

C. — *Natural sciences*

Brachet, Albert (1869-1930). Obituary by H. DE WINIWARTER, *Annuaire de l'Académie Royale de Belgique*, 143-92, 1933. ISIS

Dainelli, Giotto. The geographical work of H.R.H. the late Duke of the Abruzzi (1873-1933). *Geographical Journal* 82, 1-15, 1933. ISIS

Dawson, A. H. G. The geodetic levelling of Ceylon (1928-1929). 2 vols., 22+XXXII p.; VI+138 p. Colombo, Ceylon Government Press, 1932. ISIS

Reviewed by T. H. LABY, *Geographical Journal* 82, 78-79, 1933. "The first volume opens with the history of levelling in Ceylon prior to 1924." C. W. A.

Hamre, Ivar. The Japanese South Polar expedition of 1911-1912 : a little-known episode in Antarctic exploration. *Geographical Journal* 82, 411-23, 1933. ISIS

"As a feat of seamanship it was glorious. The name of NAOKICHI NOMURA should be remembered among the great navigators." C. W. A.

Joubin, Louis. Le docteur SCHMIDT et la vie des anguilles. *Revue des deux mondes*, 401-23, 15 juillet, 1934. ISIS

Apropos du fameux naturaliste danois JOHANNES SCHMIDT (1877-1933). G. S.

Watkins, Henry George (1907-1932). Obituary by J. M. SCOTT and F. DEBENHAM. *Geographical Journal* 80, 273-80, port., 1932. ISIS

Leader of expeditions to Edge Island 1927, Labrador 1928-9, British Arctic Air Route expedition to Greenland 1930-1. C. W. A.

D. — *Medical sciences*

Ashford, Bailey K. A soldier in science. The autobiography of BAILEY K. ASHFORD, Colonel M.C., U.S.A., with a forward by M. W. IRELAND. x+425 p., 14 pl., maps. New York, MORROW, 1934 ($3.50). ISIS

This autobiography of one of the leading physicians of the Medical Corps of the United States Army is the history of an investigator whose work has profoundly influenced recent developments in public health and tropical medicine throughout the world. As a result of his service in Puerto Rico during and after the Spanish-American war, he came in contact with the ravages of hookworm. His crusade against it was important in arousing medical and public interest and was followed ultimately by the organization of the Rockefeller Foundation and hookworm campaigns under their auspices throughout the tropical world. In 1916, he carried on in the province of Minas Geraes in Brazil a demonstration campaign against Brazilian trypanosomiasis with a mobile dispensary field hospital and clinical laboratory which bridged the gap between the rural community and the hospital. For many years he sought for the etiological factor in sprue, a puzzling tropical disease and found the yeast Monilia to be implicated. This autobiography is of especial historical interest, as it is full of references to, and comments on, the rise of scientific medicine during the period of its most rapid extension into the tropics and its most significant discoveries in the fields of the parasitic origin of various types of obscure diseases. C. A. K.

Bologa, V. L. L'Institut de l'histoire de la médecine, de la pharmacie et du folklore médical. La Faculté de médecine de l'Université " Roi Ferdinand le I^er^," de 1919 à 1928, 19-20, Cluj (Roumanie-Transylvanie.) ISIS

Bologa, Valeriu L. Les périodiques médicaux en Roumanie après la guerre. *Cultura* I, 184-87, Cluj, 1924. ISIS

Bologa, Valeriu L. Le professeur JULES GUIART, à l'occasion de son 60^e^ anniversaire (in Rumanian). Extras din *Clujul Medical*, no. 7, 40 p., 8 fig., 1 Iulie 1930. ISIS

" Biographie et analyse de l'œuvre scientifique, littéraire et didactique du grand parasitologue et historiographe médical de Lyon, qui a fondé l'enseignement médico-historique en Roumanie (Professeur à Cluj 1921-30), avec un aperçu spécial sur son activité en Roumanie et ses mérites pour resserrer les relations scientifiques franco-roumaines."

Brown, J. F. FREUD and the scientific method. *Philosophy of Science* 1, 323-37, 1934. ISIS

Crummer, Le Roy (1872-1934). Obituary by HENRY R. VIETS, *New England journal of medicine* 210, 389-92, and by M.P., *Bull. of the Institute of the History of Medicine* 2, 176-87, 1934. ISIS

(Sudhoff, Karl). Systematisches Verzeichnis der Arbeiten KARL SUDHOFFS von GRETHE HERBRAND-HOCHMUTH. *Sudhoffs Archiv für Gesch. d. Med.* 27, 131-86, port., 1934. ISIS

Vallery-Radot, Pasteur. Deux figures de savants. II. ALBERT CALMETTE. *Revue des deux mondes*, 300-14, 15 janvier 1934. ISIS

E. — *Alia*

Collins, A. Frederick. The new world of science. 308 p., 146 ills. Philadelphia, LIPPINCOTT, 1934 ($2.50). ISIS

Linn, James W. The official pictures of A century of progress exposition, Chicago, 1933. 10 p., 144 pl. Chicago, DONNELLEY, 1934. ISIS

These two books give respectively an interpretative and a pictorial account of the Chicago Exposition of 1933 and 1934. The Hall of Science of this exposition contains a remarkable display of the achievements of science and their utilization in industry. Mr. COLLINS' book is devoted mainly to the inventions based on discoveries in physics. It contains an account of the mechanism whereby the light starting from Arcturus in 1893 was utilized to turn on the illumination in 1933. The other chapters are concerned with the applications of discoveries in the field of light to problems of illumination, the photo-electric cell, the grid glow tube, and thyratron, television, stroboscope, oscillograph tube, short wave radio for the production of artificial fever and for transmission of power and beamcasting, cosmic rays, atomic energy, the micro-vivarium, and the Adler Planetarium.

C. A. K.

Vetter, Q. Dr. JAN SVATOPLUK PROCHAZKA a dejiny ved. *Zvláštni otisk z časopisu ' Přiroda,'* ročnik, 27, c. 6, 5 p., Brno 1934. ISIS

PART II

HISTORICAL CLASSIFICATION

I. — ANTIQUITY

1. — ANTIQUITY (*generalities*)

Baumann, E. D. De asthmate antiquo. *Janus* 38, 139-62, 1934. ISIS

Bidez, Joseph. L'Atlantide. *Bulletin de l'Académie royale de Belgique*, nos. 4-5, 101-26, 1934. ISIS

"En somme, si l'histoire de l'Atlantide est une pure fable, c'est sans aucun doute une fable qui a eu le don de stimuler extraordinairement l'activité de l'esprit, et, parmi les suggestions de tout genre qui nous sont venues de cette création d'un penseur poète, on n'en voit guère qui se soient montrées indignes d'un si génial initiateur. L'attente d'un retour à l'âge d'or, l'idée d'une *Atlantis nova* dont le chancelier BACON aurait voulu faire le séjour d'une sorte d'élite académique internationale, enfin la chimère d'un continent où aurait vécu l'humanité sage et omnisciente de l'astronome BAILLY, autant d'utopies brillantes auxquelles l'esprit le plus chagrin ne pourrait reprocher leur séduction." (p. 122).

(British Museum). A guide to the select Greek and Latin inscriptions exhibited in the department of Greek & Roman antiquities in the British Museum. 52 p., fig. London, 1929. ISIS

Forbes, R. J. Aus der ältesten Geschichte des Bitumens. *Bitumen*, H. 1-3, 3-16, 19 fig., 1934. ISIS

Forbes, R. J. Notes on the history of ancient roads and their construction. XI+182 p., 35 ills. (Archaeologisch-historische Bijdragen der ALLARD PIERSON STICHTING). N. V. Noord Hollansdche Uitgevers Mij, Amsterdam, 1934. ISIS

Greiff, Günther. Verschollenes Wissen. 104 p., 16 pl. Berlin, DE GRUYTER, 1934. ISIS

"Diese Abhandlung befasst sich mit einem vielerörterten Fragenkomplex, an dessen Aufklärung sehr verschiedenartige Forschungsgebiete lebhaft interessiert sind. Es werden die merkwürdigen Zusammenhänge untersucht, die zwischen den von den verschiedensten Völkern aufgestellten Namensreihen für Tage, Monate, Jahre, Stunden und Mondstationen bestehen. Die einzelnen Reihen werden sorgfältig auf ihre Gliederung und ihren ursprünglichen Aufbau hin geprüft. Der Verfasser kommt dabei zu Resultaten, die

namentlich für die vor- und frühgeschichtliche Forschung und für bestimmte Einzelfragen wie z. B. die Herkunft des Alphabetes, von grösster Bedeutung sind und den zwingenden Beweis für sehr alte, über das 2. Jtsd. v. Chr. zurückführende, transatlantische Beziehungen zwischen den Hochkulturen der Alten und Neuen Welt erbringen."

Liénard, Edmond. La mélothésie zodiacale dans l'antiquité. *Revue de l'Université de Bruxelles* 39, 471-85, 1933-34. ISIS

Müller, Reiner. Wasserfilter im Altertum. *Die Umschau*, H. 41, p. 827, 1934. ISIS

Scalinci, Noè. L'operazione di cataratta descritta da CELSO e da ANTILLO. 19 p. *Bolletino dell'Istituto storico Italiano dell'arte sanitaria*, 32, 1933. ISIS

2. — EGYPT

Breasted, James Henry. The dawn of conscience. XVIII+431 p., 19 fig. New York, SCRIBNER's, 1933. ISIS

Reviewed by GEORGE SARTON, *Isis* 21, 305-16, 1934.

Bryan, Cyril P. The papyrus EBERS. Translated from the German version. With an introduction by G. ELLIOT SMITH. XL+167 p., 16 pl., frontispiece. London, BLES, 1930 (10s. 6d.). ISIS

Dairaines, Serge. Un socialisme d'état quinze siècles avant J.-C. L'Egypte économique sous la XVIII[e] dynastie pharaonique. 169 p. Paris, GEUTHNER, 1934 (36 fr.). IISS

Mise au point bien ordonnée et très claire de l'organisation politique et économique de l'Egypte sous la XVIII[e] dynastie (1580-1345). I. Les institutions : 1. La religion, fondement des institutions; 2. Le PHARAON; 3. L'administration centrale et les hauts fonctionnaires; 4. La population hiérarchisée et les assemblées auxiliaires de l'administration centrale; 5. La famille égyptienne, son rôle. II. L'organisation économique : 1. Le régime de la propriété; 2. L'agriculture et la vie agricole; 3. L'industrie et le travail industriel; 4. Les revenus de l'état; 5. Le commerce; 6. L'économie urbaine. III. Le rayonnement de l'économie égyptienne : 1. Les conquêtes pharaoniques et leur utilité; 2. Les provinces égyptiennes de Syrie et de Palestine, leur régime de Protectorat; 3. Les Égyptiens en Nubie, au pays de Pount et au Sinaï; 4. Les relations des PHARAONS avec les grands royaumes d'Asie et les moyens de leur politique de rapprochement; 5. L'Égypte et les Iles Méditerranéenes; La révolution d'AMÉNOPHIS IV ou la première tentative d'internationalisme. L'ouvrage est très bien documenté et suivi d'une bibliographie de la XVIII[e] dynastie très riche et fort bien disposée.

L'organisation politique de l'Égypte à cette époque nous fait penser à la République de PLATON :

" Nous pouvons établir le même parallèle entre les institutions de l'Égypte et la doctrine platonicienne de l'universalisation de la propriété privée qui, sous forme de kléros constitue une propriété précaire puisque le produit des récoltes doit être réparti selon des modalités déterminées (les Lois). Il est certain que tant en visitant l'Égypte qu'en lisant les récits d'HÉRODOTE, le disciple de SOCRATE eut soin d'étudier les institutions du pays des pharaons; celles-ci durent jouer un rôle assez grand dans sa formation économique. Or on connaît l'influence considérable qu'exercèrent à leur tour sur la plupart des économistes les doctrines de PLATON dont, après MORE et ERASME, se réclame encore MABLY à la fin du XVIII^e siècle. De là à conclure à l'influence méconnue des institutions économiques de la XVIII^e dynastie pharaonique sur la doctrine actuelle du socialisme d'État, il n'y aurait qu'un pas. LIST fondera toute sa théorie économique sur l'opposition entre les intérêts immédiats qui, seuls, guideraient les particuliers, et les intérêts permanents de la Nation dont la garde incombe au gouvernement; RODBERTUS insistera sur la nécessité d'adapter la production aux besoins et d'assurer la juste répartition des produits; DUPONT-WHITE verra en l'État ' l'homme moins les passions, l'homme à une hauteur où il entre en commerce avec la vérité même, où il ne rencontre que Dieu et sa conscience '; ADOLF WAGNER enfin attribuera à l'État une véritable fonction ' de civilisation et de bien-être '... mais aucun ne se doutera que 23 siècles avant eux régnait dans la Vallé du Nil, sous l'autorité d'un monarque absolu, un socialisme d'État moral et humanitaire." (p. 125).

Je dois encore signaler une préface généreuse où l'auteur flagelle l'égoïsme stupide et destructif des gouvernements " civilisés " de notre temps. On peut rapprocher cet ouvrage de celui de J. H. BREASTED : *The dawn of conscience* (New York, 1933) qui a été longuement analysé ici (21, 305-16).

G. S.

Guiart, Jules. Medicina în timpul faraonilor. I. Traducere de Dr. VALERIA NITULESCU-BOLOGA. 51 p. (Universitatea din Cluj, Biblioteca Medico-Istorica). Cluj, Ardealul, 1926. ISIS

Rumanian translation of GUIART's summary of Egyptian medicine originally published in *Biologie médicale* (Paris, 1922). G. S.

Panayotatou, Angélique. Syllogues scientifiques et médecins grecs en Egypte depuis la conquête de NAPOLÉON jusqu'à aujourd'hui. *Bull. de la société franç. d'histoire de la médecine* 28, 199-214, 1934. ISIS

Peet, T. Eric (d. 1934). A comparative study of the literatures of Egypt, Palestine, and Mesopotamia. Egypt's contribution to the literature of the ancient world. VIII+136 p. (The Schweich lectures of the British Academy, 1929). London, MILFORD, 1931. ISIS

Reviewed by GEORGE SARTON, *Isis* 21, 305-16, 1934.

3. — BABYLONIA AND ASSYRIA

Gordon, Cyrus H. Numerals in the Nuzi tablets. *Revue d'assyriologie* 31, 53-60, 1934. ISIS

"The documents under consideration were unearthed about ten miles from Kirkuk and date from about the fifteenth century B.C. The present writer, who is preparing a series of studies on the dialect, in which they are couched, intends to discuss these texts and present a full bibliography elsewhere."

Gordon, Cyrus H. Points of the compass in the Nuzi tablets. *Revue d'assyriologie et d'archéologie orientale* 31, 101-08, 1934. ISIS

Jeanselme, E. De la représentation des eunuques dans l'art assyrien. *Bull. de la soc. franç. d'hist. de la méd.*, 28, 107-12, 1934. ISIS

Lewy, Julius. Les textes paléo-assyriens et l'Ancien Testament. *Revue de l'histoire des religions* 110, 29-65, 1934. ISIS

Louis, Maria. Bouquetin ou chèvre sauvage? *Revue d'assyriologie* 31, 71-75, 3 fig., 1934. ISIS

Neugebauer, O. Babylonian mathematics. *Scripta mathematica* 2, 312-15, 1934. ISIS

Plough, Harold H. The natural history of the Assyrian bas-reliefs. *Amherst Graduates' Quarterly*, no. 91, 195-201, 3 fig., 1934. ISIS

This provides additional illustrations supporting the argument defended by G. SARTON in his *Artificial fertilization of date-palms in the time of Ashur-nasir-pal* (*Isis* 21, 8-13, 1934). G. S.

Thompson, R. Campbell. An Assyrian chemist's vade-mecum. *Journal of the Royal Asiatic Society* 771-85, 1934. ISIS

"I append some suggested explanations for some of the receipts in an Assyrian text, of which several recensions exist, which may be considered as a *vade-mecum* for chemists."

Thompson, R. Campbell. Assyrian prescriptions for diseases of the chest and lungs. *Revue d'assyriologie et d'archéologie orientale* 31, 1-29, 1934. ISIS

Thureau-Dangin, F. La notation du quantième en accadien. (Notes assyriologiques, 82). *Revue d'assyriologie*, 31, 192-93, 1934. ISIS

Thureau-Dangin, F. Notes assyriologiques. *Revue d'assyriologie et d'archéologie orientale* 31, 49-52, 1934. ISIS

Contents : LXXVIII. Nombres ordinaux et fractions en accadien ; LXXVIII. Carré et racine carrée.

Thureau-Dangin, F. Une nouvelle tablette mathématique de Warka. *Revue d'assyriologie* 31, 61-69, 1934. ISIS

Problème de géométrie. " Il s'agit, étant donné un trapèze dont les bases et les côtés sont connus, de le diviser, au moyen de parallèles aux bases, en six aires, telles que la première soit égale à la deuxième, la troisième à la quatrième, la cinquième à la sixième, et de calculer les longueurs respectives des cinq lignes de séparation et des douze segments de ligne déterminés par les intersections des lignes de séparation et des côtés." G. S.

Tropfke, Johannes. Zur Geschichte der quadratischen Gleichungen über dreieinhalb Jahrtausend. *Jb. dtsch. Math.-Vgg.* 43, 96-107, 1933. ISIS

Vogel, Kurt. Kubische Gleichungen bei den Babyloniern? *Sitzungsberichte der Bayerischen Akademie der Wissenschaften*, 87-94, 1934. ISIS

4. — GREECE

Brunet, Pierre ; Mieli, Aldo. L'enseignement donné par le philosophe COMARIOS à la sage CLÉOPÂTRE. *Archeion* 16, 18-23, 1934. ISIS

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" Le moyen âge n'a pas été aussi *isolé* qu'on l'a dit. Il ne s'en est pas tenu à un legs unilatéral, purement dogmatique à lui fourni par une autorité religieuse, à une sorte de savoir hiérarchisé, limité strictement. Il a eu des fenêtres nombreuses sur le monde passé. Il y a donc lieu d'étudier ce qu'il en a connu et comment il l'a connu. Question d'euristique, question de méthode intellectuelle."

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The two main questions under discussion in this book are : " How far is medieval culture the product of religious forces? Is it the faithful expression of Catholic ideals, or were those ideals mutilated and disfigured by the social form in which they found expression? " Each essay contributes certain ideas in answer to these questions, but they are of unequal value as scholarly contributions. For instance the first one, " The sociological foundations " is particularly brilliant and original—presenting a number of old facts with new interpretations, and several new ideas.

The second essay, " The theological development " is well-written but adds nothing new to the subject which has already been treated by many writers.

In the third one, " Religion and science " Prof. DAWSON gives an outline of the development of medieval scientific thought. However, his summary is seriously marred by certain erroneous statements; for instance, " did not JUSTINIAN close the schools of Athens which still kept the sparks of Greek science and philosophy alive? " It has long since been pointed out that learning had already fled from these particular schools before they were formally closed. Again, the author would have us believe that the history of the mixed culture of the Western Mediterranean, i.e., Spain, Sicily, the French and Italian Rivieras, and Provence and Catalonia " have been strangely neglected by the historian", in spite of the fact that quite a few excellent books on this subject have appeared in the last decade. Nor is it all at possible to believe his interpretation of the nature of Arabic science, " In spite of its achievements Arabic science belongs to the same world as the Arabian Nights —a world of magic and mystery—and the scientist was the man who could control these mysterious forces by the power of secret knowledge.—In a word, Arabic science was magic."

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Sigerist, Henry E. The medical literature of the early Middle Ages. A program—and a report of a summer of research in Italy. *Bulletin of the institute of the history of medicine* 2, 26-50, 1934. ISIS

Singer, Samuel. Die mittelalterliche Literatur der deutschen Schweiz. 208 p. (D. Schweiz im dtsch. Geistesleben. Hrsg. v. HARRY. MAYNC. Bd. 66 u. 67). Frauenfeld, HUBER, 1930. ISIS

Reviewed by GUSTAV EHRISMANN, *DLZ* 1, 1703-05, 1930.

Smith, Lucy Margaret. Cluny in the eleventh and twelfth centuries. XXVIII+348 p. London, ALLAN, 1930. ISIS

Swain, Barbara. Fools and folly during the Middle Ages and the Renaissance. 234 p. New York, Columbia University Press, 1932. ISIS

Reviewed by ROBERT WITHINGTON, *Speculum* 7, 440-42, 1932.

Swartwout, Robert Egerton. The monastic craftsman. An inquiry into the services of monks to art in Britain and in Europe north of the Alps during the Middle Ages. 198 p. Cambridge, HEFFER, 1932. ISIS

Taeuber, Walter. Geld und Kredit im Mittelalter. XV+361 p. Berlin, HEYMANN, 1933. ISIS

Tálgrenn, Oiva Johannes. Una perspectiva grega na astronomia medieval. Homenagen ao dr. LEITE DE VASCONCELOS. 6 p. Coimbra. Imprensa da Universidade, 1931. ISIS

Continuation of the author's abstruse studies on Ptolemaic astronomical traditions in the Middle Ages. The reprint bearing the date 1931 was actually published in 1934; the paper was written in Helsinki in 1927. Since Nov. 4, 1933 the author's name is O. J. TUULIO. G. S.

Taylor, Albert Booth. An introduction to medieval romance. IX+ 268 p. London, CRANTON, 1930. ISIS

Testi, Gino. La letteratura chimica italiana alla fine del Medio-evo. *Rivista di cultura*, 11 p., 1931. ISIS

Thompson, Daniel V., jr. The study of medieval craftsmanship. A lecture delivered at the Courtauld Institute of Art, London, May 25, 1934. *Bulletin of the Fogg Art Museum*, Harvard University 3 (supplementary issue), 8 p., 1934. ISIS

Thompson, E. Margaret. The Carthusian Order in England. X+ 550 p. For the Church Historical Society. London, S.P.C.K., 1930. ISIS

Toesca, Pietro. Storia dell'arte italiana. I: Il medio evo. 1200 p. (G. E. RIZZO e P. TOESCA, *Storia dell' arte classica italiana*, T. III). Turin, Unione Tipografico-Editrice Torinese, 1927. ISIS

Reviewed by ARTHUR HASELOFF, *DLZ* 3, 365-68, 1932.

Vera, Francisco. Historia de la matemática en España, III-IV. Árabes y Judíos, siglos VIII-XVI. 301 p.; 291 p. (Biblioteca

española de divulgación científica, XI-XII). Madrid, SUÁREZ, 1933. ISIS

Vol. 2 of this elaborate *History of mathematics in Spain* dealing with the Christian mathematicians of the XIIIth, XIVth and XVth centuries was published in 1931 (*Isis* 20, 594). Vols. 3 and 4 deal with the Muslims and Jews of the VIIIth to the XVIth century (thus says the title page, but the story stops with ZACUTO at the end of the XVth century). This history is much shorter than the number of volumes would suggest. For example vol. IV. treats Muslim Jewish mathematical history from the XIIth to the XVth century in little more than 200 very small pages equivalent to less than 40 p. of my *Introduction*. However, the book will be very useful. For the sake of illustration, vol. 4 is divided as follows : 1. La invasión almorávide y los matemáticos de este período; 2. La matemática durante el segundo período de reinos de taifas; 3. Progresos de la trigonometría; 4. Los almohades; 5. El algebra de ABENBÍDER; 6. La Escuela de traductores de Toledo; 7. Matemáticos del reino de Granada; 8. Otros matemáticos de la época de la decadencia musulmana; 9. ABRAHAM ZACUTO. G. S.

Vera, Francisco. La cultura española medieval. Datos bio-bibliográficos para su historia. Tomo II, H-Z. 283 p., facs. Madrid, Imprenta Góngora, 1934. ISIS

Completion of the volume the first half of which appeared in 1933 (*Isis* 20, 579). My earlier remarks apply equally well to this second volume. The notes are very unequal, some of them being very developed, others very short. E.g., LEVI BEN GERSON, who was one of the greatest figures of the Middle Ages, is given only six lines (this may be due to the fact that vol. III of my *Introduction* has not yet appeared !) The Arabic index which I asked for is not given, but there are useful indices : (1) chronologic, (2) topographic, (3) professional. G. S.

Vitry, Paul. La sculpture française sous le règne de Saint LOUIS (1226-1270). XIV+102 p., 90 pl. Paris, PÉGASE, 1929. ISIS

Reviewed by PAUL DESCHAMPS, *Journal des savants*, 257-60, 1931.

Vyver, André van de. Les premières traductions latines (X-XI^{e} siècles) de traités arabes sur l'astrolabe. Premier Congrès international de géographie historique, Bruxelles, 1931, vol. 2, Mémoires, 266-90 (juin 1932). ISIS

Waddell, Helen. The wandering scholars. XXVIII+302 p. London, CONSTABLE, first edition 1927, 3rd edition, 1929. ISIS

Wells, John Edwin. Fifth supplement to a manual of the writings in middle English, 1050-1400. Additions and modifications to July 1932. p. 1337-1432. New Haven, Yale University Press, 1932. ISIS

Whinney, M. Dickens. The interrelation of the fine arts in England in the early Middle Ages. XVI+30 p., 16 pl. London, BENN, 1930. ISIS

Wilmart, André. Un témoin anglo-saxon du calendrier métrique d'York. *Revue Bénédictine* 46, 41-69, 1934. ISIS

Wohlhaupter, Eugen. Hoch- und Niedergericht in der mittelalterlichen Gerichtsverfassung Bayerns. 199 p. (Deutschrecht Beiträge. Hrsg. v. KONRAD BEYERLE. Bd. 12, H. 2). Heidelberg, WINTER, 1929. ISIS

Reviewed by RUDOLF HIS, *DLZ* 1, 1098-1101, 1930.

Worringer, Wilhelm. Über den Einfluss der angelsächsischen Buchmalerei auf die frühmittelalterliche Monumentalplastik des Kontinents. 16 p., 15 fig. (*Schriften d. Königsberger Gelehrten Gesellsch., Geisteswiss. Kl.*, 8, Jahr, H. 1). Halle a.S., NIEMEYER, 1931. ISIS

Reviewed by ARTHUR HASELOFF, *DLZ* 3, 646-49, 1932.

Führer, Karl. Romantik im Mittelalter. Beitrag zur Geschichte des Naturgefühls, im besonderen des 10. und 11. Jahrhunderts. 76 p. (Veröffentl. d. Semin. f. Wirtschafts- u. Kulturgesch. an d. Univ. Wien, Hrsg. v. ALF. DOPSCH. H. 6). Baden, ROHRER, 1930. ISIS

Reviewed by HENNIG BRINKMANN, *DLZ* 2, 1548-52, 1931.

Young, Karl. The drama of the medieval church. 2 vols., 1350 p., 24 pl. Oxford, Clarendon Press, 1933. ISIS

Reviewed by GEORGE R. COFFMAN, *Speculum* 9, 109-17, 1934; by KARL HAMMERLE, *DLZ* 4, 2330-34, 1933.

Zedinek, Wilhelm. Die rechtliche Stellung der klösterlichen Kirchen, insbesondere Pfarrkirchen, in den ehemaligen Diözesen Salzburg und Passau und ihre Entwicklung bis zum Ausgang des Mittelalters. Eine rechtshistorische Untersuchung der veröffentlichten Quellen. 220 p. (Veröffentl. d. Inst. f. ostbair. Heimatforschg.). Passau, 1929. ISIS

Reviewed by GEORG ARNDT, *DLZ* 2, 1378-81, 1931.

Zembrzuski, L. Regimen sanitatis Salernitanum in der älteren polnischen Literatur. *Arch. Hist. i Filoz. Med.* 10, 1-19, 1930 (in Polish). ISIS

Reviewed by FRITZ, *Mitt. zur Gesch. d. Med.* 30, 50, 1931.

Ziegler, Aloysius Kieran. Church and state in Visigothic Spain. A dissertation submitted to the faculty of sacred sciences of the Catholic University of America in partial fulfilment of the requirements for the degree of doctor of sacred theology. XIII+221 p. Washington, D.C., Catholic University of America, 1930. ISIS

7. — BYZANTIUM

Bănescu, Nicolae; Bratianu, G. J.; Constantinescu, N. A.; Iorga, N.; Lascaris, M.; Roth, V.; Soutzu, M. C. Contributions à l'histoire de Byzance et des pays post-byzantins. 174 p., 11 fig. (Académie Roumaine, *Bulletin de la section historique sous la direction de N. Iorga*, 13). Bukarest, Cultura Nationala, 1927. ISIS

Buxton, David Roden. Russian mediaeval architecture. With an account of Transcaucasian styles and their influence in the West. Cambridge, University Press, 1934. ISIS

Cottas, Vénetia. Le théâtre à Byzance. Paris, GEUTHNER, 1931. ISIS

Crowfoot, J. W. Churches at Jerash. A preliminary report of the joint Yale-British School expeditions to Jerash 1928-1930. 48 p., 14 pl. (British School of archaeology in Jerusalem, supplementary papers, 3). London, British School of Archaeology in 1931. ISIS

Reviewed by E. HONIGMANN, *OLZ* Nr. 8/9, 540-41, 1933.

Delatte, Armand. Un manuel byzantin de cosmologie et de géographie. *Bulletin de la Classe des Lettres et des Sciences Morales et Politiques* 18, 189-222, Brussels, 1932. ISIS

" L'auteur se distingue, d'une part, des écrivains chrétiens des premiers siècles, en ce qu'il fait généralement peu de cas de l'autorité des textes scripturaires dans le domaine scientifique; d'autre part, il n'a pas, comme la plupart des écrivains byzantins, de PHILOPON et JEAN DAMASCÈNE à PSELLUS, SYMÉON SETH, NICÉPHORE BLEMMIDE, subi l'emprise aristotélicienne au point d'ignorer à peu près tout le reste de la pensée antique. Sa conception du monde est fausse, certes, mais originale et digne, par certains côtés, de l'attention des historiens. Il nous a aussi conservé des extraits fort intéressants de la littérature scientifique et de la paradoxographie des anciens. L'étude de ce texte permettra donc d'enrichir d'un chapitre nouveau les ouvrages de MARINELLI, de KRETSCHMER et de BEAZLEY relatifs à la géographie physique des écrivains chrétiens et à l'histoire de la géographie au moyen âge." " Mon enquête sur le nom ou la personnalité de l'auteur est restée vaine. Il est possible, tout ou moins, de fixer un *terminus post quem* pour la composition de l'ouvrage :

il nous est fourni par les citations de JEAN DAMASCÈNE. Elle doit donc être placée entre le VIII[e] siècle et le XV[e], époque des manuscrits."

Diehl, Charles. La peinture byzantine. Ouvrage publié avec le concours de l'Académie des Inscriptions et Belles-Lettres. 110 p., 96 pl. (Histoire de l'art byzantin). Paris, VAN OEST, 1933. ISIS

Reviewed by HENRI GRÉGOIRE, *Byzantion* 8, 738-39, 1933.

Dölger, Franz. Facsimiles byzantinischer Kaiserurkunden. Aus dem Lichtbilderarchiv der Bayer. Akademie der Wissenschaften zusammengestellt, beschrieben, erläutert und in Umschrift wiedergegeben von FRANZ DÖLGER. VI+68 p., 25 pl. München, Mittel- u. Neugriech. Sem. d. Univ., 1931. ISIS

Reviewed by PERCY ERNST SCHRAMM, *DLZ* 3, 1514-19, 1932.

Duthuit, Georges; Volbach, F. L'art byzantin. Cent planches reproduisant un grand nombre de pièces choisies parmi les plus représentatives des diverses tendances, accompagnées d'exposés techniques et de notices descriptives et bibliographiques. Introduction par GEORGES SALLES. 79 p., ill. Paris, LÉVY, 1933. ISIS

Freshfield, Edwin Hanson. Les manuels officiels de droit romain publiés à Constantinople par les empereurs LÉON III et BASILE I (726-870). 30 p. Paris, LEROUX, 1929. ISIS

Reviewed by C. A. SPULBER, *Byzantion* 4, 575-82, 1929.

Gerland, Ernst. Die Grundlagen der byzantinischen Geschichtschreibung. *Byzantion* 8, 93-104, 1933. ISIS

Grégoire, Henri. L'épopée byzantine et ses rapports avec l'épopée turque et l'épopée romane. *Bulletins de la Classe des Lettres de l'Académie Royale de Belgique* 17, 463-93, 1931. ISIS

Reviewed by ROGER GOOSSENS, *Byzantion* 9, 409-12, 1934.

Grégoire, Henri. L'âge héroïque de Byzance. Mélanges offerts à M. NICOLAS IORGA, 382-97, Paris, 1933. ISIS

Reviewed by ROGER GOOSSENS, *Byzantion* 9, 113-14, 1934.

Grégoire, Henri. Etudes sur l'épopée byzantine. *Revue des études grecques* 46, 29-69, 1933. ISIS

Hamilton, J. Arnott. Byzantine architecture and decoration. London, BATSFORD, 1934. ISIS

Jeanselme, Edward. Sur un aide-mémoire de thérapeutique byzantin contenu dans un manuscrit de la Bibliothèque Nationale de Paris. *Mélanges Charles Diehl* 1, 147-70, Paris, LEROUX, 1930. ISIS

Reviewed by M. LAIGNEL-LAVASTINE, *Bull. de la société franç. d'hist. de la médecine* 28, 191-92, 1934.

Lefort, T. H.; Cochez, J. Palaeographisch album van gedagteekende grieksche minuskelhandschriften uit de IX^{e} en X^{e} eeuw. Met enkele specimina van handschriften uit de XI^{e}-XVI^{e} eeuw. Album palaeographicum. Codicum graecorum minusculis litteris saec. IX et X certo tempore scriptorum. Accedunt quaedam exempla codicum saec. XI-XVI. VII+100 p. (Katholieke Universiteit te Leuven, philologische Studiën, Tijdschrift voor classieke philologie, album-reeks, nr. 1). Leuven (no date; preface dated May 9, 1932; received October 1934). ISIS

Splendid album of a hundred very clear quarto plates. A second part to appear later will give more particulars about each of them and transcriptions. The preface includes a valuable list of other albums—not less than 18 in number ranging in date from 1708 to 1920. G. S.

Mamboury, Ernst; Wiegand, Theodor. Die Kaiserpaläste von Konstantinopel zwischen Hippodrom und Marmara-Meer. Unter Mitwirkung von UVO HÖLSCHER u. KARL WULZINGER. Mit einem Beitrag von ECKHARD UNGER. VIII+71 p., 31 fig., 118 pl. Berlin, DE GRUYTER, 1934. ISIS

Reviewed by RUDOLF KAUTZSCH, *DLZ* 5, 2091-97, 1934.

Martin, Edward James. A history of the iconoclastic controversy. Published for the Church Historical Society. London, S.P.C.K., 1930. ISIS

Muratov, Paul. La peinture byzantine. Paris, CRÈS, 1928. ISIS

Reviewed by PAUL GRAINDOR, *Byzantion*, 4, 660-70, 1929.

Petresco, J. D. Les idiomèles et le canon de l'office de Noël (d'après des manuscrits grecs des XI^{e}, XII^{e}, XIII^{e} et XIV^{e} s.). Préface de M. A. GASTOUÉ. 80 p., 156 pl., figs., Paris, GEUTHNER, 1932. ISIS

Pierce, Hayford; Tyler, Royall. L'art byzantin. Vol. 1. Paris, Librairie de France, 1932. ISIS

Runciman, Steven. Byzantine civilisation. 328 p. London, ARNOLD, 1933. ISIS

Reviewed by CH. DIEHL, *Byzantinische Zeitschrift* 34, 127-30, 1934.

Soteriou, Georgios A. Guide to the Byzantine Museum in Athens. 2nd ed. 154 p., 48 figs., 8 pl., Athens, Estia, 1931 (in Greek). ISIS

Soyter, Gustav. Byzantinische Dichtung. Ausgewählte Texte mit Einleitung, kritischem Apparat und Kommentar. XII+68 p. (Kommentierte griechische und lateinische Texte, 6). Heidelberg, WINTER, 1930. ISIS

Reviewed by F. DÖLGER, *Byzantinische Zeitschrift* 34, 73-74, 1934.

Thomson, Margaret Head. Catalogue des manuscrits grecs de Paris. contenant des traités anonymes de botanique. *Revue des études grecques* 46, 334-48, 1933. ISIS

Liste de 47 MSS. " Ce catalogue est un travail purement philologique. Ce n'est que le commencement d'une recherche entreprise avec un dessein plus étendu, celui de savoir ce qu'est l'histoire de la botanique grecque en dehors des auteurs connus, et ce que peut donner à ce sujet l'étude des manuscrits grecs dans l'état où ils nous sont parvenus. Dans ce catalogue, j'ai essayé de mettre à la disposition de ceux qui s'intéressent à ces questions un moyen de pousser plus loin les recherches. Soit à Paris, soit dans les bibliothèques des autres pays, on trouverait l'occasion de faire une étude intéressante et approfondie sur l'histoire des sciences naturelles à Byzance."
G. S.

Wellesz, E. Über Rhythmus und Vortrag der byzantinischen Melodien (Eine Musik-paläographische Studie). *Byzantinische Zeitschrift* 33, 33-66, 2 pl., 1933. ISIS

Whittemore, Thomas. The mosaics of St. Sophia at Istanbul. Preliminary report of the first year's work, 1931-1932 : the mosaics of the narthex. 24 p., 21 pl. Oxford University Press, 1933. ISIS

Reviewed by EMERSON H. SWIFT, *Art Bulletin* 16, 314-16, 1934.

III. — ORIENTAL SCIENCE AND CIVILIZATION

8. — CENTRAL ASIA

Stein, Sir **Aurel.** The Indo-Iranian borderlands : their prehistory in the light of geography and of recent explorations. (With plates XIV-XXII and 2 maps). *Journal of the Royal Anthropological Institute* 64, 179-202, July-Dec., 1934. ISIS

" The discoveries made at Mohenjodaro and Harappa have proved the existence in the Indus valley of a civilization far older than that invasion and one which knew the use of writing. Not until the script of the seals discovered at those sites is deciphered can any definite opinion be formed

as to the affinity of the language it records. But it is clear that in view of those discoveries a fresh significance attaches to the fact that a Brāhūī-speaking population is to be found to the present day in the Jhalawān and Sarāwān hills immediately above the plains about Mohenjodaro. That barren hill region would afford neither attraction nor room for settlement to any invader. There the semi-nomadic fringe, poor semi-barbarian relatives as it were, left behind by that more ancient race would be likely to remain undisturbed by those Indo-Aryan invaders, just as it was some three thousand years later when valiant Balūch 'Tumāns' swept through those hills to conquer for themselves better lands by the Indus."

9. — INDIA

Britton, S. C. Ancient Indian iron. *Nature* 134, 238-40, 277-79, 1934. ISIS

Coomaraswamy, Ananda K. A new approach to the *Vedas*. An essay in translation and exegesis. IX+116 p. London, LUZAC, 1933. ISIS

"It is very evident that for an understanding of the *Vedas*, a knowledge of Sanskrit, however profound, is insufficient. Indians themselves do not rely upon their knowledge of Sanskrit here, but insist upon the absolute necessity of study at the feet of a *guru*." The author has explained his views himself in *Isis* 19, 74-91. I quite agree with his principles but am not competent to appreciate their application. See review by OTTO STRAUSS in *DLZ* (5, 1350-51, 1934). G. S.

Coomaraswamy, Ananda K. Kha and other words denoting "zero" in connection with the metaphysics of space. *Bulletin of the School of Oriental Studies London Institution* 7, 87-97, 1934. ISIS

Filliozat, Jean. Les documents médicaux indiens au département des manuscrits de la Bibliothèque nationale. *Bull. de la soc. franç. d'hist. de la méd.* 28, 27-41, 1934. ISIS

Collections de l'abbé GUÉRIN, acquise en 1855, et de PALMYR CORDIER, acquise en 1932. G. S.

Maclagan, Edward. The Jesuits and the Great Mogul. XXII+434 p. London, BURNES OATES, 1932. ISIS

Reviewed by G. F. HUDSON, *Geographical Journal* 82, 163-64, 1933. "The first mission was sent in 1580 at the invitation of AKBAR, and activity continued until the suppression of the Society of Jesus in 1773. The mission was closely connected with early exploration beyond the Himalayas." C. W. A.

Mookerji, Bhudeb (Rasacharya Kaviraj). "Rasajala-nidhi" or Ocean

of Indian chemistry and alchemy, compiled in Sanskrit... with English translation of the author. 2 Vols. Calcutta, 1926-27. ISIS

Reviewed by J. FILLIOZAT, *Journal asiatique* 223, fasc. ann., 110-12, 1933 (received in 1934). " Le texte alchimique sanscrit que présente M.B.M. est son œuvre propre; c'est une compilation basée sur d'anciens traités et surtout, paraît-il, sur la science traditionnelle orale qui se transmet encore aujourd'hui de yogin en yogin dans le secret des forêts de l'Inde. M.B.M., auparavant simple médecin, a reçu les leçons d'un yogin initié, il tient l'alchimie indienne pour cultivée chez les « anciens Aryas » depuis l'an 1.950.000.000 avant J.-C. Il la déclare divine, tant qu'il lui paraît fort difficile de l'exposer, que les traités existants, tous très altérés, n'en sauraient donner aucune idée et que par ailleurs l'initié n'y peut rien ajouter de son cru..."

Moonje, B. S. Netracikitsâ. Vol. 1, 7-230-17 p., 1 port., 114 fig. Poona, Çamkar Narhar Joçi, 1930. ISIS

Reviewed by J. FILLIOZAT, *Journal asiatique* 223, fasc. ann., 104-07, 1933 (received in 1934). " C'est pour la première fois sans doute que l'ophtalmologie européene paraît sous un vêtement sanscrit. La *Netracikitsâ* (oculistique) du Dr. M. est l'œuvre d'un praticien rompu aux méthodes occidentales et qui, même, n'a étudié qu'après coup celles de l'ancienne médecine indienne; c'est dire que nous n'avons pas affaire à un de ces *vaidya*, quelque peu frottés d'anglais et de sanscrit (et parfois plus d'anglais que de sanscrit), qui ne voient dans la médecine européenne qu'un écho dégénéré de l'antique *Âyurveda*. M.M. s'est gardé des exagérations et du parti pris et il a tenté avec une délicatesse, dont il y a vraiment plaisir à le louer, la synthèse des notions traditionnelles de son pays et des conceptions modernes."

Müller, Reinhold F. G. Zur anatomischen Systematik im Yajus *Sudhoffs Archiv für Geschichte der Medizin* 27, 20-31, 1934. ISIS

Müller, Reinhold F. G. Über Pitta oder Galle, unter Bezug zur Tridoṣa-Lehre der altindischen Medizin. *Janus* 38, 77-106, 1934. ISIS

Vogel, J. Ph. Annual bibliography of Indian archaeology for the year 1932. Vol. VII. x+178 p., 10 pl., 7 fig. Leyden, BRILL, 1934. ISIS

Wood, Casey A. Sinhalese and South Indian ceremonials in the prevention and treatment of disease. *Annals of medical history* 6, 483-90, 9 fig., 1934. ISIS

10. — CHINA

Cressey, George B. The evolution of Chinese cartography. *Geographical review* 24, 497-98, 1934. ISIS

Karlgren, B. The authenticity of ancient Chinese texts. *Bulletin of the Museum of Far Eastern Antiquities*, no. 1, 165-83, Stockholm, 1929. ISIS

" The vicissitudes which the ancient Chinese documents have had to go through in being handed down in necessarily few manuscripts in the course of many centuries made the Chinese scholars realize, at a very early date, the necessity of trying to verify whether they were authentic or spurious. In the time of the T'ang dynasty there were keen observers like LIU TSUNG-YÜAN, and in that of the Sung dynasty the researches of this kind resulted in a well-developed scientific movement." " All these critical studies have shaken the faith in a good number of texts, which were earlier considered to be genuinely ancient. It might be said that at present a kind of equilibrium has been reached : the Chinese scholars of today on the whole accept the results arrived at by the researches from Sung to Ts'ing time, and consider the matter closed. European sinologues are also very often satisfied with repeating the verdicts of the Chinese philologists, and consider their results as definitive, without entering into the details of their proofs. However, the Chinese scholars have worked with criteria of very unequal value. It is high time that modern sinologues looked into the question of how those ' definitive ' results have been gained, and proceed to a thorough revision of them. It is obvious that the tests vary very much with the nature of the works to be examined, but I will draw attention to some of the principal criteria adduced by the Chinese scholars." Since writing the above KARLGREN has already accomplished a part of the Herculean task to which he has addressed himself. More power to him ! G. S.

Karlgren, Bernhard. The history of the Chou Li and Tso Chuan texts. 59 p. *Bulletin of the Museum of Far Eastern Antiquities*, no. 3, Stockholm, 1931. ISIS

" The aim of the present investigation was in the first place to vindicate the value of the Chou li and Tso chuan texts as truly archaic Chinese writings, which can be freely used for archaeological, historical and philological researches " (p. 59). The author has proved that those two texts existed already in the middle of the second century B.C., but they may contain various Han interpolations. G. S.

Karlgren, Bernhard. Shi king researches. *Bulletin of the Museum of Far Eastern Antiquities*, no. 4, 117-85, Stockholm, 1932. ISIS

Noda, Churyo. Chou pi suan ching no kenkyu (An inquiry concerning the *Chou pi suan ching*). 183 p. Kyoto : Academy of Oriental Culture, Kyoto Institute, 1933. ISIS

Reviewed in the *Journal of the American Oriental Society* 54, 96-7, 1934. Japanese study on one of the oldest Chinese treatises on mathematics, ascribed to the Chou dynasty (1122-249 B.C.). See my *Introduction* (1, 494). " Dr. NODA has succeeded in elucidating many points which have long been shrouded in mist, and his bibliographical and astronomical research will

prove to be an important source of information for students of ancient Chinese sciences. The entire text is reprinted in the appendix." G. S.

Soulié de Morant, George. Précis de la vraie acuponcture chinoise. Doctrine — diagnostic — thérapeutique. 201 p., 14 fig. Paris, Mercvre de France, 1934 (15 fr.). ISIS

The most elaborate treatise on the subject in a Western language, by a specialist who has not only studied that medical method for more than thirty years but has also introduced it into the West. Had this book appeared a few years earlier my own account of acupuncture and moxibustion in my *Introduction* (II, 78) would have been far more elaborate. G. S.

Swann, Nancy Lee. " Madder " in China. *Annals of medical history* 6, 285-86, 1934. ISIS

Ts'ao, Yuan-Yü. Chung kuo ku tai chin tan chia ti she pei ho fang fa (Equipment and methods of the ancient Chinese alchemists). *K'o Hsüeh* (*Science*) 17, 31-34, 1933. Science Society of China. ISIS

The article opens with an historical introduction. In Chinese the alchemists are called Lien tan chia (7150, 10618, 1139), the elixir producers, and Lien chin chia (7150, 2032, 1139), the gold producers. The author combines the two names and calls them Chin tan chia, the gold and elixir-of-immortality producers. It was early discovered that the heating of cinnabar produces mercury. There is no doubt that mercury was known at the beginning of the Han dynasty. Lead and mercury were the " wings of the alchemists", lead having been discovered even earlier than mercury. By the second century A.D., it was known that white lead could be reduced in the flame, and that mercury occurred in cinnabar, could be volatilized, and could be fixed by sulfur. The combination (alloying) of lead and mercury was called " the wrestling of the dragon and tiger". It was believed that lead, mercury, and fire combined in definite proportions. The real foundation of Chinese alchemy may be considered to date from the time of Wei Po-yang (2nd century A.D.). The greatest development took place in the T'ang and Sung dynasties. Alchemy gradually disappeared after the Yuan dynasty and is now practically non-existent. The author emphasizes the fact that the art of the alchemists was not confined to the production of immortality pills and gold, but included the making of medicines, the refining of gold, the casting of metals, fermentation, a knowledge of oils and waxes, dyes, foodstuffs, and sleight-of-hand. The alchemists made a great contribution to chemical knowledge. The latter part of the article describes in detail the equipment and methods of the alchemists. The headings are as follows: the laboratory, the altar, the stove, the pot, distillation, grinding, sublimation, and the use of earth and mud. The author mentions that there are many other processes which he does not describe. The article is illustrated with twenty-one diagrams of apparatus and equipment, taken from original sources. A bibliography of 35 references (all Chinese classics) is appended. The historical references in the article

are in accord with generally accepted opinion. The compilation of the technical details of the work of Chinese alchemists is a field of endeavor which has scarcely been touched by modern scholars. H. B. C.

Van Aalst, J. A. Chinese music. 84 p., figs. (China, Imperial maritime customs. II. Special series : no. 6). Re-issued and sold by the French Bookstore, Peiping, under the authority of the Inspector General of Customs, 1933. ISIS

This is a photographic reprint of the original edition published in 1888.

11. — JAPAN

Morimoto, Rokuji. L'âge du bronze au Japon et l'expansion de la civilisation des Han vers l'Est. *Revue des arts asiatiques* 8, 65-76, 4 pl., 2 cartes, 1934. ISIS

" Au cours des dix dernières années, les études sur l'âge du bronze au Japon se sont multipliées. En 1929, nous avons pu publier un ' Tableau des sites de l'âge du bronze au Japon ' qui donne un aperçu de cette activité archéologique. Nous avons mentionné environ un millier de sites et une trentaine d'espèces d'objets découverts, dont le nombre dépasse plusieurs milliers. La majorité des gisements se trouve dans la partie sud-ouest du Japon, voisine du continent chinois et de la presqu'île coréenne. Plus on s'avance vers le nord-est, plus les vestiges deviennent rares, et dans la partie nord-est il n'en existe aucune trace. Les objets principaux trouvés dans ces sites sont des objets en bronze, des armes en pierre copiées sur celles de bronze, ainsi que de la poterie du type *Yayoi* en terre cuite. Au Japon, comme d'ailleurs partout, à l'époque de l'âge du bronze les objets les plus estimés ont été ceux qu'on exécutait dans ce métal. Les plus représentatifs et les plus importants sont les poignards, les bouts de lances et un genre de cloche appelé *dôtaku*. Nous essaierons d'en établir la chronologie, et de faire ressortir les tendances et les particularités de cette époque lointaine en nous basant sur les faits fournis par l'étude des armes en bronze et des *dôtaku*."

Schnell, Ivar. Prehistoric finds from the island world of the Far East, now preserved in the Museum of Far Eastern Antiquities, Stockholm. *Bulletin of the Museum of Far Eastern Antiquities*, no. 4, 15-104, 17 pl. Stockholm, 1932. ISIS

Account of the rich Stockholm collection of prehistoric objects obtained not only in Japan but in the Kuriles and Kamtchatka as well. Excellent illustrations and bibliography. The progress of our knowledge of prehistoric Japan is the more remarkable when one realizes that our first inkling of it dates only from 1878 (EDWARD S. MORSE). SCHNELL's memoir includes (p. 17-46) a summary of the history of prehistoric research in Japan and of the present state of knowledge with many maps. G. S.

12. — ISRAEL
(*Including works devoted to Palestine*)

Bentwich, Norman. Palestine. With a foreword by H. A. L. FISHER. 302 p. (The modern world, a survey of historical forces. Edited by H. A. L. FISHER). London, BENN, 1934. ISIS

"I have written, I hope, objectively, though my treatment may be said not to be impartial. It is impossible to write vividly of Palestine without a point of view; and I have a conviction that the building up of the Jewish National Home is both possible and good. At the same time I believe with equal faith that the Arabs and Jews may together form a happy, progressive, bi-national Palestine, because their deeper interests coincide. And the two aspects of the Mandate in accordance with which the country is governed are, in my view, entirely consistent."

Friedenwald, Harry. The use of the Hebrew language in medical literature. *Bulletin of the Institute of the History of Medicine* 2, 77-111, 1 pl., 1934. ISIS

Gershenfeld, Louis. The Jew in science. VIII+224 p. Philadelphia, Jewish Publication Society, 1934 ($2.75). ISIS

This is an undocumented general review of the history of science with emphasis on the Hebrew contributors and contributions. We learn that RHAZES was of Hebrew extraction; that Hebrew physicians and translators contributed to Moslem science; that HASDAI at Cordova translated DIOSCORIDES into Arabic from the Greek; that KOPHON, the author of *Anatomia porci*, was a pupil of the Jew ELISNS at the medical school at Salerno, where the first instructors were mainly Arabian Jews; that Jewish physicians fostered science in Moorish Spain and taught at Montpellier; that the most important astronomical tables of the Middle Ages were either compiled by or were the original contributions of Jewish astronomers; that Jewish physicians practised dissection and were expert in embryology and haematology; and that AVENZOAR (1070-1162) of Cordova was the first parasitologist, having described *Sarcoptes scabiei*, the itch insect. Greatest of all was MAIMONIDES (1135-1204), whose writings were cited for centuries and translated into many languages. His scientific works include treatises on venoms, diet, asthma, psychic disorders, intercourse, the physician's prayer, and the Jewish calendar. His prominence led to the preëminence of Jewish medicine in Egypt in the 12th and 13th centuries. IBN DAVID, or JOHN OF SEVILLE, astronomer, astrologer, and mathematician, greatly influenced ROGER BACON. The Tibbonite family was famed for three centuries as translators, astronomers, mathematicians, zoologists, and inventors. BENVENUTUS GRASSUS, the author of *Practica oculorum*, was a Jew. The Crusades increased the hostility against the Jews, especially in Spain, but Jews continued to be prominent in medicine and science in the Middle Ages and during the Renaissance in all European countries. The book contains 116 pages of lists of Jewish contributors to the science and art of medicine and to the modern sciences in all fields,

and closes with an account of Jewish institutions of scientific research in Palestine and an account of Jewish supporters of scientific enterprises and research throughout the learned world, a record which all can admire.
C. A. K.

Lōw, Immanuel. Die Flora der Juden. IV. Zusammenfassung, Nachträge, Berichtigungen, Indices, Abkürzungen. XV+740 p. (*Veröffentlichungen der Alexander Kohut Memorial Foundation*, 6). Wien, Verl. d. Kohut Foundation, 1934. ISIS

Reviewed by J. RUSKA, *DLZ* 5, 1002-04, 1934. Preceeding vols. were reviewed by JULIUS RUSKA in *Isis* 6, 428; 8, 210; 15, 181-82.

Loison, Dr. A propos des accouchements chez les Hébreux. *Bull. de la société franç. d'hist. de la méd.* 28, 131-45, 1934. ISIS

Macdonald, Duncan Black. The Hebrew literary genius. An interpretation. Being an introduction to the reading of the Old Testament. XXIV+227 p. Princeton, University Press, 1933. ISIS

Reviewed by GEORGE SARTON, *Isis* 21, 316-19, 1934.

14. — ISLAM (*also Arabia*)

ʿAlī ʿAbdurrāziq. L'Islam et les bases du pouvoir. *Revue des études islamiques*, 353-91, 1933. ISIS

Commencement de traduction du livre déjà fameux *Al-Islām wal-uṣūl al-ḥukm* de ʿALĪ ʿABDURRĀZIQ publié au Caire en 1925 (J'ai sous les yeux la troisième impression arabe). Le même ouvrage a été traduit en anglais par CHARLES C. ADAMS du Caire (auteur de *Islam and modernism in Egypt*, London 1933) mais cette traduction est encore inédite. G. S.

Bravmann, Max (geb. 1909 in Eppingen, Baden). Materialien und Untersuchungen zu den phonetischen Lehren der Araber. XI+135 p. (Inaugural-Dissertation zur Erlangung der Doktorwürde der hohen philosophischen Fakultät der Schlesischen Friedrich-Wilhelms-Universität zu Breslau). Göttingen, DIETERICH, 1934. ISIS

Elaborate study of the early Arabic views on phonology, the earliest of its kind since the publication of A. SCHAADE's SĪBAWAIHI's *Lautlehre* (Breslau Diss., Leiden, 1911). In appendix translation of IBN SĪNĀ's treatise on the subject. The author is now living in Jerusalem. G. S.

Brunschvig, Robert. Quelques remarques historiques sur les Médersas de Tunisie. *Revue tunisienne* 2, 262-85, 2 fig., carte, 1931. ISIS

Despois, Jean. Kairouan. Origine et évolution d'une ancienne capitale musulmane. *Ann. de Géogr.*, 159-77, 2 fig., 1 pl., 1930. ISIS

Reviewed by CH. MONCHICOURT, *Revue tunisienne* 1, 271-73, 1930.

Farmer, Henry George. Reciprocal influences in music 'twixt the Far and Middle East. *Journal of the Royal Asiatic Society*, 327-42, 1934. ISIS

Laignel-Lavastine, M.; Naficy, Abbas. Les influences cosmiques sur l'évolution des maladies d'après les anciens médecins persans. *Bull. de la société franç. d'hist. de la méd.* 28, 178-81, 1934. ISIS

Margoliouth, D. S. Lectures on Arabic historians (Delivered before the University of Calcutta, February 1929). 160 p. University of Calcutta, 1930. ISIS

This is worth while reading because it is based upon a long familiarity with Arabic histories. The author vindicates their impartiality especially that of MISKAWAIHI (*Intr.* 1, 687). This is important because it corrects popular impressions to the contrary, as I found them expressed, e.g., recently in E. F. GAUTIER: *Mœurs et coutumes des musulmans* (Paris, 1931), a book brilliant and suggestive, but full of prejudices. G. S.

Morata, Nemesio. Un catálogo de los fondes árabes primitivos de el Escorial. *Al-Andalus* 2, 87-181, 1934. ISIS

Renaud, H. P. J. ABULCASIS, AVICENNE et les grands médecins arabes ont-ils connu la syphilis? Résumé de sa communication au Congrès de Médecine de Tunis, mars 1934. *Bull. de la soc. franç. d'hist. de la méd.* 28, 122, 1934. ISIS

Renaud, H. P. J. Un prétendu catalogue de la Bibliothèque de la Grande Mosquée de Fès daté de 1268 Hég./1851 J.-C. *Hespéris*, 25 p., 1934. ISIS

Suivi d'un "Inventaire sommaire des manuscrits relatifs aux sciences de la bibliothèque de la Zāwiya de SĪDĪ ḤAMZA" basé sur la double copie du catalogue de 1851-52 dans la possession de l'auteur. "J'espère pouvoir publier ensuite d'autres listes de manuscrits scientifiques faisant partie de diverses collections marocaines. Ainsi seront amenés à pied d'œuvre nombre de matériaux utiles à ceux qui entreprendront d'écrire une histoire complète et exacte de la littérature arabe dans ce pays." G. S.

Renaud, H. P. J. La transcription des noms propres au Moyen Age et les erreurs qu'elle occasionne. A propos d'une communication

sur la médecine arabe. *Bull. de la société franç. d'hist. de la médecine* 28, 182-86, 1934. ISIS

Ribera y Tarrago, Don Julián (1858-1934). Obituary by EMILIO GARCÍA GÓMEZ. *Al-Andalus* 2, I+VIII, 1934. ISIS

Stark, Freya. The valleys of the Assassins and other Persian travels. 365 p., 32 illus., 6 maps. London, MURRAY, 1934 (12s. 6d.). ISIS

A magnificent book. The author is not only a very courageous traveller, but a sensitive, wise, and noble woman. G. S.

Torrey, Charles Cutler. The Jewish foundation of Islam. X+164 p. New York, Jewish Institute of Religion Press, 1933. ISIS

Reviewed by D. B. MACDONALD, *Isis* 21, 319-22, 1934.

Tritton, A. S. Spirits and demons in Arabia. *Journal of the Royal Asiatic Society* 715-27, 1934. ISIS

Zetterstéen, K. V. Die arabischen, persischen und türkischen Handschriften der Universitätsbibliothek zu Uppsala. Verzeichnet und beschrieben. Uppsala, le Monde oriental, vol. 22, XVIII+530 p., Uppsala, 1928. ISIS

Fortsetzung des von C. J. TORNBERG im Jahre 1849 herausgegebenen Katalogs nebst einem Anhang, hebräische, syrische und samaritanische Handschriften enthaltend.

PART III

SYSTEMATIC CLASSIFICATION

I. — SCIENCE IN GENERAL

16. — HISTORY OF SCIENCE

Boccardi, Jean. Les sciences d'observation à travers les âges. *Rev. sc.* 71, 225-30, 1933. ISIS

Bologa, Valeriu L. L'enseignement de l'histoire de la science aux universités. Sep. ex : Lucrările Intâiului Congres al Naturaliştilor din România, 18-21 pag. 61-73, Cluj, 18-21 Aprilie, 1928. ISIS

Bologa, Valeriu L. Histoire des sciences naturelles et de la médecine

dans l'enseignement roumain (in Rumanian). Liječnički Vjesnik br. 4, Zagreb, 1933. ISIS

Bologa, Valeriu L. Les premiers naturalistes roumains. Extrait du livre publié en hommage et dédié à la mémoire du Professeur J. CANTACUZÈNE, p. 36-40, Paris, 1934. ISIS

Congrès international d'histoire des sciences, III^e^. (Coimbra, Porto, Lisboa), 30 septembre — 6 octobre 1934). *Archeion* 16, 100-02, 1934. ISIS

Enriques, Federigo. Signification de l'histoire de la pensée scientifique. 68 p. (Actualités scientifiques et industrielles, 161 ; ***Philosophie et histoire de la pensée scientifique***, I). Paris, HERMANN, 1934. ISIS

This little book is so terse and so full of ideas, the fruits of the author's unusual experience and wisdom, that an adequate analysis and discussion of it would easily be as long as itself, if not longer. It is divided as follows : La science et l'histoire; La conception positiviste de la science; Le postulat de la raison; Vérité et erreur; Le problème du *non-sens* ; La raison pure de KANT; Les postulats rationnels dans la construction de la science; Pragmatisme et idéalisme; La civilisation et les motifs de la science; Les problèmes de la philosophie éclairés par l'histoire de la pensée scientifique; Rationalisme et historisme; L'unité de la science; Construction de l'histoire; Traduction et valeur des textes; L'histoire objective de DUHEM; La continuité de la pensée scientifique. I am in complete agreement with ENRIQUES' criticism of DUHEM. This book ought to be Englished. In the meanwhile I wish to quote as a sample the author's vindication of the study of ancient science : " Il n'est guère possible de comprendre l'évolution de la pensée moderne, si on ne se reporte pas à ces origines lointaines : la tâche quotidienne qui développe les motifs philosophiques d'une école déterminée peut les ignorer; mais elles sont mises en cause chaque fois qu'il s'agit d'une revision critique et philosophique des idées : l'histoire la plus ancienne redevient quelque chose de vivant, précisément à l'heure d'un renouveau ! " (p. 64). G. S.

Evans, Herbert McLean. Exhibition of first editions of epochal achievements in the history of science. 48 p. Berkeley, University of California Press, 1934 (30 cents). ISIS

Catalogue raisonné of 114 items with introduction. G. S.

Forti, Umberto. Nulla e molto di nuovo intorno al sole. 13 p., *Nuova Antologia*, 16 Febbraio 1931. ISIS

Gunther, R. T. Oxford and the history of science. With an appendix on scientific collections in college libraries. 49 p. Oxford University Press, 1934 (2s.). ISIS

Inaugural lecture delivered in the Examination Schools, 25 October, 1934.

(History of Science Society). The History of Science Society council record, by LAO G. SIMONS. Abstract of papers, program of the History of Science Society meeting, Cambridge, Massachusetts, 1933. Tenth annual report of the corresponding secretary and treasurer of the History of Science Society for the year 1933. *Isis* 21, 234-40, 1934. ISIS

(Isis). Changes in the editorial board of *Isis*. *Isis* 21, 304, 1934. ISIS

(Isis). Summary of *Isis* accounts for 1933. *Isis* 21, 233, 1934. ISIS

Sarton, George; Welborn, Mary Catherine; Siegel, Frances. Brief table of contents of vols. I to XX of *Isis*, together with an Index to the eighty-nine reviewers. *Isis* 21, 502-618, 1934. ISIS

Sarton, George. Preface to volume XXI. Casting bread upon the face of the waters. (Jamaica). *Isis* 21, 488-501, 1934. ISIS

Sarton, George. Thirty-ninth Critical bibliography of the history and philosophy of science and of the history of civilization (to September 1933—with special reference to the nineteenth and twentieth centuries) *Isis* 21, 339-486, 1934. ISIS

Turner, D. M. The book of scientific discovery. How science has aided human welfare. With a foreword by CHARLES SINGER. 259 p., 31 pls., 39 figs. London, HARRAP, 1933 (7/6). ISIS

This book includes in its scope all of the sciences as well as some of their modern applications. The selection of subject matter is excellent and the illustrations significant. The treatment is quite general rather than precise and particular; for example, two eminent scientists are anonymously referred to only as pupils of PASTEUR, malaria is discussed without naming LAVERAN, ROSS, GRASSI, or GORGAS, and the illustrations are without source, or, if the source is cited, the citation often lacks the essential documentary details. The biological past is least well done. SCHLEIDEN, SCHWANN, and VON MOHL are omitted in the account of the cell, and PURKINJE is misspelled, while in the history of " the conception of evolution " LAMARCK and MORGAN are excluded. C. A. K.

Westaway, F. W. The endless quest. 3000 years of science. XIX+ 1080 p., 51 pl., 193 fig. London, BLACKIE, 1934. (21s.). ISIS

Two other books by the same author, formerly H.M. Inspector of secondary schools, were reviewed in our vol. 4, 119-22: *Scientific method*, 1919; *Science and theology*, 1920. The present volume is far more ambitious. Says the Preface: " Although primarily a history of science, this book makes a new departure: it deals with the subject critically. It presents

to the layman the main facts of science as they have come down to us through the ages, and it does this in such a way that the layman may, in some measure, judge for himself the value of the evidence by which the facts are supported. It shows the weakness of science as well as its strength, especially the present-day weakness of fabricating hypotheses on a too slender basis of definitely ascertained facts. It shows the points of contact between science, mathematics, and philosophy. It holds up in relief such great exemplars of scientific method as GALILEO, NEWTON, FARADAY, DARWIN, and PASTEUR. It stresses the need for a wider scientific outlook on the part of all persons in authority." That intention is undoubtedly excellent, but the author has overreached himself, and his book is open to many objections, as well from the purely historical point of view, as from the scientific and philosophical ones. A detailed discussion is not worthwhile. He summarized mediaeval thought as follows (p. 97): "200-500, Evening closes in. 500-800, Night. 800, First signs of dawn. 800-1000, Twilight, with thick mist. 1000-1200, Morning; mist gradually thinning. 1200-1400, Light breaks through clearly at intervals. 1400-1600, Clear sunlight." *Sancta simplicitas!* The contributions of the Hindus and Arabs are disposed of in three pages! Most of the present day problems of science are discussed, but in a strange order. For example, *after* having dealt with radioactivity, modern atomic theories, the quantum theory, relativity, the author devotes a long paragraph (p. 608-9) to explaining that 10^3 means a thousand. The book will be useful as a first guide, but we cannot help being sorry and anxious for any reader who would depend upon it for his historical and scientific information. G. S.

17. — ORGANIZATION OF SCIENCE

(Internal organization is meant, see ISIS 1, 195. *For external organization, national or international, see section* 55)

Gregory, Sir **Richard.** Science in the public press. *Science* 80, 323-30, 1934. ISIS

Sherrington, C. S. Language distribution of scientific periodicals. *Nature* 134, 625, 1934. ISIS

Apropos of the recent second edition of the world list of scientific periodicals (1934) containing more than 3600 individual titles. The main languages represented are:

1. English	13,494	scientific periodicals
2. German	6,186	scientific periodicals
3. French	5,013	scientific periodicals
4. Russian	1,833	scientific periodicals
5. Italian	1,667	scientific periodicals

Urbain, Georges; Boll, Marcel. La science, ses progrès, ses applications. T. 1, La science jusqu'à la fin du XIX^e siècle. 384 p., 6 pls., 1160 figs.; T. 2, Les applications et les théories actuelles, 424 p., 6 pls., 1200 figs. Paris, LAROUSSE, 1933-34. ISIS

The completion of this superbly illustrated encyclopedia of the sciences and their applications makes available in two folio volumes a finely developed and comprehensive summary of the sciences and their utilization in modern industry. It is also a compendium of scientific theory, and an iconography of the instrumentation of research and of the scientific equipment of industry. It also contains a superb gallery of portraits of the investigators whose work it describes. While it is devoted mainly to the fields of mathematics, physics, and chemistry, it contains a few important accounts of developments and investigators in the biological sciences. The index includes more than 20,000 references and over 5,000 names. It forms a permanent record of basic historical value, not only because of the critically edited text, but especially because of the photographic record of scientific apparatus and industrial equipment which is further enhanced by the finely executed portraits. C. A. K.

A word list of scientific periodicals published in the years 1900-1933. Second edition, XIV+780 p. London, Oxford University Press, 1934. ISIS

Reviewed by C. S. S., *Nature* 134, 435-37, 1934.

18. — PHILOSOPHY OF SCIENCE

Bender, Wm. The method of physical coincidences and the scale coordinate. *Philosophy of Science* 1, 253-72, 1934. ISIS

Benjamin, A. Cornelius. The mystery of scientific discovery. *Philosophy of science* 1, 224-36, 1934. ISIS

Bohr, Niels. La théorie atomique et la description des phénomènes ; quatre articles précédés d'une introduction. Traduction française de ANDRÉE LEGROS et LÉON ROSENFELD. 120 p. Paris, GAUTHIER-VILLARS, 1932. ISIS

Reviewed by J. PELSENEER, *Revue de l'Université de Bruxelles* 39, 3°-9°, 1933-34.

Bohr, Niels. Atomic theory and the description of nature. I : Four essays, with an introductory survey. VI+119 p. Cambridge, University Press, 1934. ISIS

Reviewed by HERBERT DINGLE, *Nature* 133, 962-64, 1934.

Driesch, Hans. Der Begriff des " Standpunktes " in der Philosophie. *Sudhoffs Arch. für Geschichte der Medizin* 27, 213-22, 1934. ISIS

Eddington, Sir Arthur. The expanding universe. VIII+182 p., New York, MACMILLAN, 1933. ISIS

Reviewed by H. T. DAVIS, *Isis* 21, 322-26, 1934.

Einstein, Albert. On the method of theoretical physics. *Philosophy of science* 1, 163-69, 1934. ISIS

Reprint of the Herbert Spencer lecture, delivered at Oxford, June 10, 1933. See *Isis* 21, 443.

Hanappe, Ed. L'activité. Synthèse de philosophie scientifique. 110 p., 7 fig. Bruxelles, L'édition Universelle, no date, received in summer 1934. ISIS

Contents : 1. Activité prénaturelle-activité naturelle; 2. Activité spontanée; 3. Activité passive; 4. Activité mixte ou combative; 5. Loi de l'activité universelle.

Infeld, Leopold. The world in modern science. Matter and quanta. Transl. from the Polish by LOUIS INFIELD. With an introduction by ALBERT EINSTEIN. 287 p., frontispiece, 25 figs. New York, PUTNAM, 1934 ($2.00). ISIS

This is a clear and simplified statement of the modern theory of the physical universe. The author discusses the methods of thought in physics, radiation, matter, the nuclei of atoms, matter and radiation, and quantum mechanics.

C. A. K.

Jeans, Sir **James H.** The new background of science. VIII+301 p. New-York, MACMILLAN, 1933. ISIS

Reviewed by H. T. DAVIS, *Isis* 21, 326-28, 1934.

Jeans, Sir **James H.** The new world-picture of modern physics. Presidential address delivered at Aberdeen on September 5, 1934. *Nature* 134. 355-65, 1934; *Science*, 80, 213-22, 1934. ISIS

Klages, Ludwig. Vom Wesen des Rhythmus. Auszug aus dem Vortrage. *Sudhoffs Archiv für Geschichte der Medizin* 27, 223-28, 1934. ISIS

Lévy, H. The universe of science. XIII+224 p. London, Century, 1933. ISIS

Reviewed by H. T. DAVIS, *Isis* 21, 328-30, 1934.

Malisoff, William Marias. An examination of the quantum theories. II and III. *Philosophy of science* 1, 170-75, 398-408, 1934. ISIS

"1. The BOHR quantum theory, like the original PLANCK formulation, rests on an inconsistent blend of continuity and discontinuity requirements. 2. The various principles of correspondence and the adiabatic hypothesis are only postulates. 3. Alternative, yet mutually exclusive, explanations appear in the framework of the old theory. 4. A theory may accomplish

much without explaining its own empirical generalizations and without being quite accurate or even consistent."

Margenau, Henry. Meaning and scientific status of causality. *Philosophy of science* 1, 133-48, 1934. ISIS

Meyerson, Emile (1859-1933). Obituary by ARNOLD REYMOND, *Archeion* 16, 107-08, 1934. ISIS

Reiser, Oliver L. Time, space and *Gestalt*. *Philosophy of science* 1, 197-223, 1934. ISIS

(Rignano, Eugenio). Prix EUGENIO RIGNANO sur l'Evolution du concept de temps. *Isis* 21, 304, 1934. ISIS

II. — FORMAL SCIENCES (Knowledge of forms)

19. — LOGIC AND THEORY OF KNOWLEDGE

Kattsoff, L. Concerning the validity of Aristotelian logic. *Philosophy of science* 1, 149-62, 1934. ISIS

Norris, O. O. A preamble to an organismic theory of knowledge. *Philosophy of science* 1, 460-78, 1934. ISIS

Quine, Willard Van Orman. A system of logistic. x+204 p. Cambridge, Harvard University Press, 1934. ISIS

From A. N. WHITEHEAD's preface : " In this book Dr. QUINE has effected an extension of the scope of Symbolic Logic. The advance is more than an improvement in symbols. It extends to fundamental notions. He has introduced a generality adequate to the complexity of the subject matter; and the symbolism embodies the generality of its meaning. I have no hesitation in stating my belief that Dr. QUINE's book constitutes a landmark in the history of the subject. The basic idea from which the book starts is that of ' ordination'. This idea includes the traditional subject-predicate doctrine as one of its particular exemplifications. But it is immensely more general. Logic should be adequate to explore every type of the connexity of things. The concept of ' ordination ' makes some advance towards this ideal. Naturally it is a notion difficult to grasp in its generality. The danger of such generality is that it may become unworkable : that it may refuse to march. But in Dr. QUINE's treatment a remarkable facility of treatment is achieved."

Smith, Henry Bradford. Abstract logic or the science of modality. *Philosophy of science* 1, 369-97, 1934. ISIS

20. — MATHEMATICS

Archibald, R. C. Bibliography of the theory of linkages. *Scripta mathematica* 2, 293, 1934. ISIS

Archibald, R. C. Lambda functions. (*Query* no. 20). *Scripta mathematica* 2, 300, 1934. ISIS

Archibald, R. C. Outline of the history of mathematics. Second edition revised and enlarged. 58 p. Mathematical association of America, Oberlin, Ohio, 1934. ISIS

"Very many small changes have been made, and a complete new page on recent discoveries in connection with Babylonian mathematics has been inserted. The 'Literature List' of the first edition has been considerably extended, not alone by new references but also by a few notes, which are amplifications of the text."

Bridgman, P. W. A physicist's second reaction to Mengenlehre. *Scripta mathematica* 2, 224-34, 1934. ISIS

Coolidge, J. L. The rise and fall of projective geometry. *American mathematical monthly* 41, 217-28, 1934. ISIS

"It is hard to escape the sad conclusion that the field of synthetic projective geometry is pretty much worked out. This gloomy foreboding can only be put forth with all possible caution. There have been so many times when the geometrical field, even the most elementary field, has appeared to be completely exhausted and then surprisingly new and attractive results have appeared. Elementary geometry involving nothing more complicated than a little trigonometry, made far more progress in the nineteenth century than in the sixteen centuries preceding, but the analogy is not perfect. Most of the theorems about the straight line, circle, and sphere which we can demonstrate at all, find their easiest proofs by the most elementary means. Such is not the case with projective geometry. An algebraic handling is almost always the easiest and generally the most adaptable. Until and unless some totally new principle is discovered, the subject of synthetic projective geometry is no longer a very fruitful field for original research. On the other hand, it would be a disaster to the whole geometric fabric if a time ever came when synthetic methods were completely abandoned. Not only have they a permanent beauty which no one who has ever studied them can forget, but they afford an invaluable insight into the inner significance of geometrical science and an invaluable training for any geometer."

Couffignal, Louis. Les machines à calculer, leurs principes, leur évolution. 88 p., ill. Paris, GAUTHIER-VILLARS, 1933. ISIS

Davis, Harold T. Tables of the higher mathematical functions,

computed and compiled under the direction of HAROLD T. DAVIS, Indiana University and the Cowles commission for research in economics. Vol. I : XIII+377 p., 2 pl. (Published as a contribution of the Waterman Institute for scientific research, Indiana University). Bloomington, Indiana, Principia, 1933. ISIS

Reviewed by GEORGE SARTON, *Isis* 21, 330-34, 1934.

Enriques, F. L'infinito nella storia del pensiero. *Scientia* 54, 381-401, 1933. Traduction française, ibid., suppl., 163-81. ISIS

Fry, Thornton C. A mathematical theory of rational inference. *Scripta mathematica* 2, 205-21, 1934. ISIS

Keyser, Cassius Jackson. Mathematics and the science of semantics. *Scripta mathematica* 2, 247-60, 1934. ISIS

Miller, G. A. Background of mathematics in America. *Science* 80, 356, 1934. ISIS

Rust, W. M., jr. An operational statement of CANTOR's Diagonalverfahren. *Scripta mathematica* 2, 334-36, 1934. ISIS

Sergescu, Petre. Matematica la Români. Conferință ținută la " Liga Culturală " din Brașov. 40 p. Vălenii-de-Munte, Așezamântul tipografic Datina Românească, 1934. ISIS

Tropfke, Johannes. Zur Geschichte der quadratischen Gleichungen über dreieinhalb Jahrtausend. *Jahresbericht der deutschen Mathematiker-Vereinigung* 44, 26-119, 43 fig., 1934. ISIS

Wavre, Rolin. Is there a crisis in mathematics? With reference to the notion of existence and a doubtful application of the law of excluded mean. *American mathematical monthly* 41, 488-99, 1934. ISIS

III. — PHYSICAL SCIENCES (Knowledge of inorganic nature)

23. — ASTRONOMY

Dean, James E. The old Syriac calendar. *Journal American Oriental Society* 54, 129-41, 1934. ISIS

" In 1929 the University of Chicago was allowed the privilege of photographing the Karkaphensian manuscript in the possession of Mar SEVERIUS,

Archbishop of Syria and Lebanon. Most of the MS, consists of quotations from the Bible, but there is some miscellaneous matter toward the end. And the last seven folios contain a treatise on the Syriac calendar. There are several tables and directions for using them. According to the colophon preceding the calendar, the MS was written in 1003/4 A.D., in the Monastery of the Forty Martyrs on Dry River, which, WRIGHT informs us, was located near Melitene. The name of the scribe is not given, and the date of the original composition of the tables is also unknown. The chief interest of the original author of this calendar was the date of Lent, but a number of other things are included."

Greiff, Günther. Verschollenes Wissen. 104 p., 16 pl. Berlin, DE GRUYTER, 1934. ISIS

Concerning calendar and zodiac lore and terminology. See review by E. ZINNER, *DLZ* 5, 1722-24, 1934. G. S.

Warburg, A. Italienische Kunst und internationale Astrologie im Palazzo Schifanoja zu Ferrara (1912). A. WARBURG, *Die Erneuerung der heidnischen Antike* 459-81, 627-44, 13 pl., Leipzig, 1932. ISIS

Warburg, A. Orientalisierende Astrologie (1926). A. WARBURG, *Die Erneuerung der heidnischen Antike* 559-65, 657, Leipzig, 1932. ISIS

Wolf, R. Geschichte der Astronomie. XIV+815 p. Munich, OLDENBOURG, 1877; reprinted Leipzig, KOEHLER, 1933. ISIS

Reviewed by J. K. FOTHERINGHAM, *Mathematical Gazette* 17, 340, 1933. "Nothing except the covers is new. But the reprint should be useful. If WOLF's *Geschichte* has been superseded at all, it is by his own *Handbuch der Astronomie* (1890-3), but though the *Handbuch* is fuller, the *Geschichte* is far more readable." C. W. A.

Zinner, Ernst. Die frankische Sternkunde im 11. bis 16. Jahrhundert. 118 p., 10 figs. XXVII. Bericht der Naturforschenden Gesellschaft in Bamberg, 1934. ISIS

Important contribution to the history of astronomy partly based upon local sources. It is clear that in order to write a comprehensive history of astronomy all over the world, we need such regional studies which must necessarily contain valuable information overlooked by other historians. Though this is called a history of astronomy in Franconia from the eleventh to the sixteenth century the account of the first four of those six centuries is so short (4 p.) that it would be more correct perhaps to describe the book as a history of astronomy in the fifteenth and sixteenth centuries in Nuremberg. In earlier times the main center was Bamberg, where the author is living today, being director of the Remeis Observatory. The book ends with a biographical dictionary of Franconian astronomers to the end of the sixteenth century (p. 84-113) and a long bibliography. G. S.

24. — PHYSICS

Dingle, Herbert. Physics and the public mind. *Nature* 133, 818-20, 1934. ISIS

Ford, William W. Development of our early knowledge concerning magnification. *Science* 79, 578-81, 1934. ISIS

Forti, Umberto. Gli ultimi tentativi di una concezione meccanica della luce, e la teoria elettromagnetica. *Periodico di matematiche* 10, 189-203, 1930. ISIS

Macdonald, H. M. Theories of light. *Science* 80, 233-38, 1934. ISIS

Address of the president of Section A—mathematical and physical sciences—British Association for the Advancement of Science, Aberdeen, September, 1934.

Schierbeek, A. Uit de eerste eeuwen der mikroskopie. *Vragen van den Dag*, 505-28, Leiden, 1934. ISIS

The evolution of the microscope from the time of ROGER BACON to VAN LEEUWENHOEK. M. C. W.

Van der Klaauw, C. J. Oude microtomen in het Nederlandsch historisch natuurwetenschappelijk museum te Leiden. *Bijdragen tot de geschiedenis der geneeskunde* 14, 187-95, 1 pl., 1934. ISIS

Veiga, A. Botelho da Costa. Exposição de física. Catalogo. 92 p. (Biblioteca nacional). Abril de 1930. Lisbon, Oficinas Graficas. ISIS

25. — CHEMISTRY, PHYSICO-CHEMISTRY, INDUSTRIAL CHEMISTRY

Alexander, Elizabeth H. A further bibliography of the late Professor JOHN FERGUSON, M.A., LL.D., F.S.A. Regius Professor of Chemistry in the University of Glasgow, 1874-1915. 47 p., 8 ills. *The Records of the Glasgow Bibliographical Society*, 1934. ISIS

Miss ALEXANDER made a bust of the late JOHN FERGUSON (here reproduced as frontispiece) and published an elaborate bibliography of his writings in 1920 (*Isis* 7, 581). The present supplement is divided into three parts : 1. Papers printed since Professor FERGUSON's death; 2. Manuscripts in Glasgow University Library; 3. Chronological list of the manuscripts. How fortunate the scholar who can inspire such a devotion ! G. S.

Davis, Tenney L. What a student of the history of chemistry may see and do in Paris. *Journal of Chemical Education* 11, 211-16, 12 fig., 1934. ISIS

Very interesting article which every chemist would do well to read before visiting Paris. Compare D. E. SMITH's booklet on *Historical mathematical Paris* (Paris, 1924; *Isis* 7, 313). G. S.

Hooijkaas, Reijer. Het begrip element in zijn historisch-wijsgeerige ontwikkeling. Proefschrift ter verkrijging van den graad van doctor in de wis- en natuurkunde aan de Rijks-Universiteit te Utrecht. 238 p. Utrecht, Fa. SCHOTANUS & JENS, 1933. ISIS

Very elaborate study of the evolution of the concept of " element". The thesis is written in Dutch but is followed with a French summary of 4 pages. G. S.

Kremers, Edward and colaborers. Phytochemical terminology. *Journ. A. Ph. A.*, March 1932 and March 1933. ISIS

These two papers are also part of a general treatise on phytochemistry. After a few introductory words on the unsatisfactoriness of the nomenclature of the phytochemical lumber chamber, the author discourses on the word Paraffin. The terms Podophyllic acid, Picropodophyllin, Podophyllotoxin, Podophylloresin, and Podophylloquercetin are explained by A. H. UHL. In the second paper an attempt is made to do away with the confusion that has arisen in the loose usage of the word Terpene. E. K.

Kremers, Edward. Phytochemical literature. *Journ. A. Ph. A.*, April 1932 and Aug. 1934. ISIS

These papers represent a phase of work on a phytochemistry in the broadest sense. In a few introductory remarks, the first paper delimits the scope of the bibliography discussed under this head and then takes up the treatises of RUNGE and KOCH. The second paper continues with ROCHLEDER, HUSEMANN, HILGER and HUSEMANN; and EBERMAYER. More recent texts are to be considered later. E. K.

Lippmann, Edmund O. von. Bericht (Nr. 100) über die wichtigsten im 2. Halbjahre 1933 erschienenen Arbeiten aus dem Gebiete der reinen Zuckerchemie. *Die Deutsche Zuckerindustrie* 8 p., 1934. ISIS

Moles, E. Discurso leído en el acto de su recepción. Del momento científico español. 1775-1825. 117 p., ill. Madrid, BERMEJO, 1934. ISIS

This address which Dr. MOLES delivered upon entering the Academia de Ciencias Exactas, Físicas, y Naturales reviews the scientific contributions of D. ANTONIO DE MARTÍ Y FRANQUÉS, D. FRANCISCO CARBONELL Y BRAVO,

D. MATEO ORFILA, D. FAUSTO DE ELHUYAR, and D. ANDRÉS MANUEL DEL RÍO. Because of his retiring nature, his versatility, his well-equipped private laboratory, his investigations of the gases of the atmosphere, and his reluctance to publish his results, MARTÍ resembled CAVENDISH. The effective teaching of CARBONELL and of his medical colleagues was reflected in the brilliant career of ORFILA, who later introduced their methods into France. Dr. MOLES shows that the DE ELHUYAR brothers were the first to isolate tungsten and that they introduced new methods of analysis, established the composition of wolframite, accurately determined the density of tungsten and its trioxide, and described the " emulsion " now known as tungstic acid hydrosol. The address closes with a résumé of the work of A. M. DEL RÍO, who discovered vanadium and, like ELHUYAR, made notable contributions to chemistry, mineralogy, and mining in both Spain and Mexico. The book is richly illustrated with facsimiles, portraits and diagrams of apparatus. It closes with an interesting review by B. CABRERA of Dr. MOLES' contributions to physical and inorganic chemistry. M. E. W.

Nierenstein, M. The natural organic tannins. History : chemistry : distribution. VIII+319 p. London, CHURCHILL, 1934. ISIS

This is an authoritative monograph on a branch of organic chemistry to which the author's own researches have contributed greatly. Indeed, it is an account of his researches and of those of his predecessors and contemporaries. It fills a definite gap in the literature which is available to the specialist. The author is well known to readers of *Isis* for a number of articles relative to the history of chemistry and alchemy and for his " Incunabula of Tannin Chemistry " (*Isis* 19, 591). As might be expected, his treatment of tannins is everywhere tinctured by his historical interest, and the book contains many details which have derived from his study of the history of science. This is especially true of the first chapter, " Introduction : definition and classification", in which the early history of the tannins and of our knowledge about them is discussed. After considering the various tests for the tannins, NIERENSTEIN concludes that the test with gold-beater's skin is probably best. Chapter II deals with " The catechins, catechutannins and other condensed tannins", chapter III to VI with the "Hydrolysable tannins : gallotannin, acer-tannin, glucogallin and hamamelitannin, ellagitannins, caffetannins and paulliniatannin, and chapter VIII, written by MACGREGOR SKENE of the University of Bristol, with " The botany of the tannins". A short addendum, subject index, authors index, and plant index terminate the volume. The book is of interest not only to workers in the chemistry of the tannins but also to those who are interested in the most recent advances in structural organic chemistry. Future students of the history of organic chemistry will have occasion to use it. T. L. D.

26. — TECHNOLOGY

(*For Mining, see* 32. *Geology* ; *for Industrial Chemistry*, 25. *Chemistry*. *See also Arts and Crafts under* 45).

Dickinson, H. W. ; Straker, E. The Shetland watermill. *Transactions of the Newcomen Society* 13, 89-94, 1932-33. ISIS

Edwards, Llewellyn N. The evolution of early American bridges. *Transactions of the Newcomen Society* 13, 95-116, 2 fig., 1932-33. ISIS

Gálvez-Cañero, A. de. La metalurgia de la plata y del mercurio (bosquejo histórico). 37 p. Madrid, IX Congreso Internacional de Química Pura y Aplicada, 1934. ISIS

An excellent review of the historical development of metallurgy, with special reference to Spanish processes of recovering silver and mercury. M. E. W.

Gomme, A. A. Date corrections of English patents, 1617-1752. *Transactions of the Newcomen Society* 13, 159-64, 1932-33. ISIS

Grossmann, H. Der Einfluss der alten Glashütten auf den schweizerischen Wald. *Bericht über das geobotanische Forschungsinstitut Rübel in Zürich für das Jahr* 1933, 15-32, 1934. ISIS

" Da unser Land rohstoffarm ist, hat es früher nur wenig Industrie besessen. Eines der Gewerbe, das sich, wie der spärliche Bergbau und die Ziegelei, auf einheimische Rohstoffe stützen konnte, war die Glasfabrikation. Sie war früher ein wichtiges Verwendungsgebiet für Holz, das heute ganz verlassen ist. Und zwar musste der Wald sowohl den Hauptrohstoff, die Asche, wie auch das für den Schmelzvorgang und die Glasbereitung nötige Brennmaterial liefern. Welche Rolle er dabei zu spielen und welche Einwirkungen er dadurch zu erdulden hatte, soll im Folgenden behandelt werden."

Hylander, C. J. American inventors. XVI+216 p., 16 pls., 33 figs. New York, MACMILLAN, 1934. ($2.00). ISIS

This is a brief summary of lives and inventions of 19 leading American inventors including BENJAMIN FRANKLIN (lightning rods, fireplace, armonica), FITCH (steamboat), EVANS (steam engine), ELI WHITNEY (cotton gin), JOHN and ROBERT STEVENS (steamboat and railroad), ROBERT FULTON (steamboat and submarine), MCCORMICK (reaper), HOWE (sewing machine), MORSE (telegraph), ERICSSON (fire engines and caloric machines), GOODYEAR (vulcanized rubber), SHOLES (typewriter), WESTINGHOUSE (air brake), BELL (telephone), HOLLAND (submarine), BERLINER (microphones and victrola), EDISON (incandescent light, batteries, telephone, motors, cinema), JENKINS (cinema and television) and DE FOREST (radio). An appendix lists 18 others. Portraits and diagrams supplement the text. C. A. K.

Paull, Clarence V. South Crofty: past and present. *Transactions of the Newcomen Society* 13, 147-50, 1932-33. ISIS

Pholien, Florent. L'horlogerie et ses artistes au pays de Liége. Etude rétrospective. 131 p., 65 illus. Liége, Imprimeries nationales des militaires mutilés et invalides de la guerre, 1934. ISIS

Read, Thomas T. The early casting of iron. A stage in iron age civilization. *Geographical Review* 24, 544-54, 7 fig., 1934. ISIS

" Despite the large amount of work that has been done on the history of iron and the important way in which that metal is interrelated with archeological studies, in both the geographical and the historical fields, very little scholarly research has been directed towards the discovery of the casting of iron and its implications. Archeologists and geographers are generally unfamiliar with the technical processes involved, while conversely mineral technologists are unfamiliar with the geographical and cultural aspects. Two recent writers in the metallurgical field have supported the erroneous belief, widely held, that iron was not cast before the Middle Ages. J. NEWTON FRIEND concludes his ' *Iron in antiquity* ' with ' a brief note on the discovery of cast iron,' which he ascribes to accident in the operation of the German *stückofen* in the Middle Ages. But museums have many specimens of cast iron that antedate medieval times by more than a thousand years. T. A. RICKARD in his ' *Man and metals* ' says : ' The making of cannon, and more particularly the making of cannon-balls, was the chief incentive to the invention of cast-iron.' The need for a cheap metal from which to cast cannon balls and cannon did indeed furnish a new use for cast iron, while the *stückofen* made it cheap. But cast iron had been used for other purposes more than a thousand years before."

Rowe, Arthur. Pumping engines on Great Wheal Busy. *Transactions of the Newcomen Society* 13, 151-53, 1932-33. ISIS

IV. — BIOLOGICAL SCIENCES
(Knowledge of organic nature)

27. — BIOLOGY (*Generalities*, " *Natural history* ")

Almquist, E. Umwelt und Organismus bei Bildung neuer Formen. *Sudhoffs Arch. für Geschichte der Medizin* 27, 293-98, 1934. ISIS

British Museum (Natural history). A short history of the collections. XI+62 p. London, British Museum, 1931 (6d.). ISIS

Codellas, Pan. S. Rejuvenations and satyricons of yesterday. *Annals of medical history* 6, 510-20, 2 fig., 1934. ISIS

Conklin, Edwin G. A generation's progress in the study of evolution. (Penrose memorial lecture). *Proceedings of the American Philosophical Society* 74, 137-58, 1934. ISIS

In 1896, the author took part in a symposium on evolution organized by the American Philosophical Society : the speakers were LIBERTY H. BAILEY, EDWARD D. COPE, who defended the Lamarckian view, and the

author who championed the Weismannian view. After 38 years he was invited by the same Academy to survey the same subject, and concluded as follows :

" From my earliest introduction to the science of biology I have been an admirer of AUGUST WEISMANN. Of late it has become fashionable to decry the speculations and theories of WEISMANN since they were not based on experiment. But no one can truthfully deny that his logical deductions were a powerful stimulus to research and that many of them have been confirmed in a truly remarkable manner by recent work. He maintained, long before it was demonstrated by genetics and cytology that the hereditary substance consists of discrete particles, his determinants, arranged in a linear series in the chromosomes. His prediction that one of the maturation divisions in the formation of the egg and sperm must lead to the reduction of the chromosomes in those cells to one-half the number present in somatic cells was almost as brilliant an example of scientific prophecy as was the prediction of the existence and position of the planet Neptune. And finally his explanation of the origin of fitness in the living world is still, I think, the best scientific conception that has ever yet been offered. I cannot better express my own views on this subject than by closing with these words from the preface of his last book (1902) : ' Although I may have erred in many single questions which the future will have to determine, in the foundation of my ideas I have certainly not erred. The selection principle controls in fact all categories of life units. It does not create the primary variations but it does determine the paths of development which these follow from beginning to end, and therewith all differentiations, all advances of organization and finally the general course of development of organisms on our earth, for everything in the living world rests on adaptations.' " G. S

Eggers, Friedrich. Das Gesetz der Ungleichartigkeit der Organismen. *Sudhoffs Archiv für Geschichte der Medizin* 27, 235-42, 1934. ISIS

Friederichs, Karl. Vom Wesen der Ökologie. *Sudhoffs Arch. für Geschichte der Medizin* 27, 277-85, 1934. ISIS

Guttmacher, Alan Frank. Life in the making. With the assistance of ELLERY RAND. XII+297 p., 8 figs. New York, Viking Press, 1933 ($2.75). ISIS

This book deals mainly with the sex lore of man and therefore has many historical items intermingled with the results of the lastest investigations in the fields of endocrinology and the biology of twinning. The misconceptions of primitive man and of the philosophers who sought to explain the riddles of conception and birth are reviewed, and ARISTOTLE's observations are commended. To his opinion that the testes were merely weights to keep the seminal ducts from blockade by entanglements is attributed the idiomatic name " stones " for these important organs. The conflicts of the ovists, spermists, and animalculists are reviewed, and to HARVEY's erroneous opinion that the *aura seminalis* was the only mechanism of the semen is attributed a deterrent action on further experimentation. A dramatic account is given of VON BAER's search for, discovery (1827) of, and later demonstration (1828)

of the mammalian egg before the Biological Congress at Berlin. KÖLLIKER's proof (1841) that spermatozoa were the body cells and not parasitic animalcules opened the way for later discoveries of the equal share of both parents in the determination of offspring. The author reviews subjects of sexual rhythms; patterns of sexual behavior among animals generally and primates in particular; castration as practised in the ancient times and among the Russian sect, the Skoptsi, and in both sexes; transplantation of sex hormones; cryptorchidism; the folk lore of sex determination and the cytological and genetic scientific solution of the problem; sterility and fertility; and the phenomena of sibling and identical twins. The figure of the famous Biddenden Maids, the predecessors of BARNUM's world-famous Siamese twins, is reproduced. Much valuable and significant material on sexual phenomena in plants is left unutilized in this interesting review, and the popularizing motif leaves the extensive historical references undocumented, except for a brief list of significant books. The author falls into the all-too-common delusion of chemists that organisms will eventually be created in the test-tube and that "conception will be an impersonal process of ions and atoms, and of flasks and fluids." The history of organisms has no existence in his concept of life and its perpetuation. C. A. K.

Hofsten, Nils von. Från CUVIER till DARWIN. Ett blad ur den jämförande antomiens historia. Särtryck ur *Nordisk tidskrift*, 389-411, 1922. ISIS

From CUVIER to DARWIN.

Hofsten, Nils von. Skapelsetro och uralstringshypoteser före DARWIN. 73 p. (Uppsala Universitets Årsskrift, program 2, 1928). Uppsala, Lundequistska Bokhanden, 1928. ISIS

Ideas of creation and of spontaneous generation before DARWIN.

Janisch, Ernst. Über die mathematische Erfassung biologischer Prozesse. *Sudhoffs Arch. für Geschichte der Medizin* 27, 286-92, 1934. ISIS

Jeanselme, E. De l'introduction des notions biologiques dans le domaine de l'érudition et de l'histoire. *La Presse médicale*, 8 p., février 1934. ISIS

Lillie, Ralph S. The problem of vital organization. *Philosophy of science* 1, 296-312, 1934. ISIS

Macbride, T. H.; Martin, G. W. The myxomycetes. A descriptive list of the known species with special reference to those of North America. XI+339 p., 21 pl. New York, MACMILLAN, 1934 ($6.00). ISIS

This group of microscopic organisms living on decaying organic material

and in the soil has long been known as slime-molds. They have been generally regarded as plants, because of resemblances to fungi, but probably more correctly regarded as rather complex sarcodine Protozoa. Professor MACBRIDE's revision of the species of the entire world is based on recent analyses of the life cycle, and is the life work of an eminent specialist. In addition to the synoptic monograph there is an introductory chapter on morphology by Dr. MARTIN, a list of rejected names and a bibliography. The earliest reference to a slime-mold was made by PANKOW (1654) and RAY (1690), RUPPENIUS (1718), DILLENIUS (1719), and BUXBAUM (1721) continued to refer to the same organism by various different names. MICHELI (1729) was the first to recognize and describe several genera and species, but his work was not recognized until PERSOON (1794) revived it. In the early part of the last century FRIES expanded the knowledge of the group in a series of papers and named the group Myxogastres, later changed to Myxomycetes by LINK (1833). DEBARY (1858) was the first to unravel the life cycle and expand the concept of the group. The monographs of ROSTAFINSKI (1873), MASSEE (1892), and that of LISTER (1894, 1911) greatly enlarged the numbers of genera and species. To LISTER is due the idea that the affinities of the group are with the Protozoa as indicated in the change of name from Myxomycetes to Mycetozoa. A series of papers by JAHN (1902-1928) have added to the complexity of the interpretations of the life cycle. C. A. K.

Meyer, Adolf. Das Organische und seine Ideologien. *Sudhoffs Archiv für Geschichte der Medizin* 27, 3-19, 1934. ISIS

Meyer, Adolf. Umwelt und Innenwelt oragnischer Systeme nebst Bemerkungen über ihre Simplifikation zu physischen Systemen. *Sudhoffs Arch. für Geschichte der Medizin* 27, 328-52, 1934. ISIS

Rashevsky, N. Foundations of mathematical biophysics. *Philosophy of science* 1, 176-96, 1934. ISIS

Schuster, Julius. Über neuere Schriften zur Geschichte und Philosophie des biologischen Streits um die vitale Kausalität. Ein kritischer Bericht. *Mitt. z. Gesch. d. Med.*, 33, 89-99, 1934. ISIS

Singer, Edgar A., jr. Beyond mechanism and vitalism. *Philosophy of science* 1, 273-95, 1934. ISIS

28. — BOTANY

(*Agronomy, Phytopathology, Palaeobotany*)

Laufer, Berthold (1874-1934). The lemon in China and elsewhere. *Journal American Oriental Soc.*, 54, 143-60, 1934. ISIS

" Of the numerous useful fruits that we owe to India the lemon is the most democratic and the most widely known. It has become a denizen

of this world and, with its Indic name, has penetrated even into the darkest parts of Africa and the tropical jungles of South America. Next to the word ' tobacco', the word type ' lemon', of Indic origin, is the most universal, reverberating from every tongue of the globe."

Mörner, Carl Th. Om nomineringen av Browallia-släktet och dess arter, särskilt de Linnéanska. En bibliografisk studie. *Svenska Linné-Sällskapets Årsskrift* 17, 1-26, 1 fig., Uppsala, 1934. ISIS

History of our knowledge of the genus Browallia, thus named by LINNAEUS. G. S.

Monteiro, Arlindo Camilo. Da fitologia sacra. Contribuïção histórica para o estudo da botânica, da terapêutica e da etnografia. 140 p., pl. Edição do autor, (no place, presumably Lisboa), 1934. ISIS

Elaborate study of the relations between botanical folklore and science, ethnology, therapeutics, and religion, beautifully illustrated. As there are neither table of contents, nor index, it is difficult to appraise the book without reading it completely, and this is not easy as it is written in Portuguese. I shall gladly give my copy to any competent scholar willing to review it for *Isis*. G. S.

Shear, C. L. Mycology, scientific and otherwise. *Mycologia* 26, 201-09, 1 port., 1934. ISIS

Address of the retiring President of the Mycological Society of America Boston, Mass., December 28, 1933, with an excellent portrait. I note the following remark : " A knowledge of the general history and development of science, and especially of botany and mycology, is of the greatest value in helping one to get a proper perspective and appreciation of the problems presented." (p. 202). G. S.

Smith, Kenneth M. Recent advances in the study of plant viruses. With a foreword by F. T. BROOKS. XII+423 p., 1 pl., 67 figs. Philadelphia, BLAKISTON, 1934 ($4.00). ISIS

This book has historical value in that there has been no previous treatise summarizing this new and active field of biological research. It records results to date of investigations on the mosaic and other virus diseases of plants, some of which are of great financial importance, such as those of the tomato, tobacco, potato, sugar cane, sugar beet, wheat, and of many cultivated bulbous and flowering plants. The book contains chapters on symptomatology, physical properties, relations to insect vectors, transmission and spread, physiology, and discussions of the pros and cons of the living nature of the viruses, recovery, resistance, immunity, cultivation, photography, compounding of variations in virulence, mutations, and methods of differentation and classification of the plant viruses. There is also a brief account of the various virus diseases. The chapters are all well documented and have terminal bibliographies. The existence of excessively small invisible micro-organisms was first suggested by PASTEUR in his researches on rabies.

The first virus disease in plants was described by IWANOWSKI (1892) who demonstrated the passage of the virus of tobacco mosaic through bacteria-proof filters. This was repeaetd in 1899 by BEIJERINCK who put forth the theory of a *contagium vivum fluidum*. Over one hundred devastating virus diseases affect plants, insects, fish, birds, and mammals. C. A. K.

29. — ZOOLOGY

Dulles, Foster Rhea. Lowered boats, a chronicle of American whaling. VIII+292 p., 9 pls. New York, HARCOURT, BRACE, 1934 ($2.75).
ISIS

This is a popular account of an industry which for a time was preeminently American and which contributed in a large way to the exploration of the South Seas and the Polar Regions. It increased our knowledge of marine mammals and of the geography of Oceania and the polar seas, and played an important part in the broadening of popular interest in the sea and the sciences pertaining thereto. Its indirect influence was perhaps of even greater consequence than its immediate contributions. It manifested and conserved the spirit of adventure and enterprise which in all times contributes to scientific discovery (see SARTON 1931, *Isis* 16, 115-23). C. A. K.

Ritter, Wm. E.; Benson, Seth B. "Is the poor bird demented?" Another case of "shadow boxing". *The Auk* 51, 169-79, 1934.
ISIS

Another authenticated report of birds' fighting their own images reflected from mirrors. M. C. W.

V. — SCIENCES OF THE EARTH
(Implying knowledge of both organic and inorganic nature)

31. — GEOGRAPHY AND OCEANOGRAPHY

Bishop, C. W. The Isle of Gold and the Isle of Silver. *Geographical Review* 24, 671-72, 1934. ISIS

"To the category of tales of mysterious 'lost' islands belongs the legend of the Isle of Gold and the Isle of Silver. EDMOND CHASSIGNEUX, in an article entitled 'Rica de Oro et Rica de Plata' (*T'oung Pao*, vol. 30, 1933, pp. 37-84), has recently reexamined their story and has offered a new explanation of its origin."

Bowman, Isaiah. Geography in relation to the social sciences. Geography in the schools of Europe by ROSE B. CLARK. XXII+382 p. 17 illus. (Report of the Commission on the social studies, part 5). New York, SCRIBNER'S, 1934. ISIS

This is a part of the Investigation of the social studies in the schools, organized by the American historical association. BOWMAN's report is as one might expect very illuminating. It might be considered an excellent introduction to the study of geography. Most of the illustrations are borrowed from the *Geographical Review*, which has done so much for the clarification of geographical ideas and methods and their diffusion in the United States. This is followed by Miss ROSE B. CLARK's very methodical survey of the teaching of geography in the main European countries. G. S.

Maḥmūd Murād (1888-1925). Geographical discoveries of four thousand years. 140 p. in Arabic, c. 100 illust. Cairo, An-Nahḍah, 1340 = 1922. ISIS

Though published twelve years ago this Arabic history of geography had escaped my attention. The author was then professor of geography in the Khedivial College of Cairo. It is brief but the author was tolerably well informed; there are many illustrations and many maps, but the latter are unfortunately too small and unclear. It is a good elementary textbook. Its sources are exclusively English. I gather from a MS. Arabic note written on the flyleaf of my copy that the author was born at Mīna al-qamḥ in 1888 and died in 1925. I have no means of checking those data. G. S.

32. — GEOLOGY, MINERALOGY, PALAEONTOLOGY, MINING

(*For Palaeobotany, palaeozoology and palaeoanthropology, see respectively*, 28. *Botany*, 29. *Zoology*, and 39. *Prehistory*)

Adams, Frank Dawson. Origin and nature of ore deposits. An historical study. *Bulletin of the Geological Society of America* 45, 375-424, port., 1934. ISIS

"It is the purpose of the present paper to trace the development of our knowledge of that branch of geology which deals with the origin of ore deposits, a department of geological science which in recent times has attained a position of great importance, and having done so, to inquire in how far the views of the ancient writers have proved to be correct, why they failed to reach a correct interpretation when they did fail, what advances we have made toward a knowledge of the subject, and finally to ask in how far we can be sure that our present views are definitely and finally established."

Edwards, W. N. Guide to an exhibition illustrating the early history of palaeontology. VI+68 p., 19 fig., frontispiece (British Museum, natural history, special guide no. 8). London, British Museum, 1931 (9 d.). ISIS

Forbes, R. J. The story of bitumen. From the earliest times up to the nineteenth century. 63 p., 37 fig. (n.d., received 1934). ISIS

Rickard, T. A. Man and metals. A history of mining in relation

to the development of civilization. 2 vols. XIII+1068 p., 108 fig. New York, Whittlesey House, McGraw-Hill, 1932. ISIS

Reviewed by George Sarton, *Isis* 21, 334-36, 1934.

Testi, Gino. Appunti storici sui gas naturali spontaneamente infiammabili all'aria. *Rivista di storia delle scienze mediche e naturali* 25, 144-48, 1934. ISIS

VI. — ANTHROPOLOGICAL AND HISTORICAL SCIENCES
(Knowledge of man, past and present)

34. — ANATOMY

Pazzini, Adalberto. Il canale vidiano e il suo nervo (saggio di ricerca storico-medica). Atti della Società italiana di storia delle scienze mediche e naturali, IV. Congresso Nazionale, 159-70, Rome, 1933. ISIS

History of our knowledge of the Vidian nerve and canal.

35. — PHYSICAL ANTHROPOLOGY
(*Anthropometry and races of man*)

Hrdlička, Aleš. The hypotrochanteric fossa of the femur. (*Smithsonian miscellaneous collections*, 92). 49 p., 14 pl., 1934. ISIS

Contents: Earlier data on the fossa; Summary of observations from the literature; New observations on the fossa; The fossa in lemurs; The fossa in New World monkeys; The fossa in Old World monkeys; The fossa in anthropoid apes; The fossa in early man; The fossa in later and modern man; The fossa in lower mammals; Summary.

Pearl, Raymond; Pearl, Ruth DeWitt. The ancestry of the long-lived. XIII+168 p., frontispiece. Baltimore, Johns Hopkins Press, 1934 ($3.). ISIS

"This book embodies the results of an extensive investigation on the biological problems of longevity. It deals primarily with the ancestry of a group of persons living at very advanced ages. All of the persons in this group were nonagenarians or centenarians at the time they were studied."

37. — PSYCHOLOGY
(*Human and comparative*)

Campbell, Charles MacFie. Human personality and the environ-

ment. x+252 p., 11 illus. New York, MACMILLAN, 1934 ($3). ISIS

Lowell lectures, Boston, February 1933. A book full of experience and wisdom. My only criticism is that I would have liked to see it completed with a chapter of practical conclusions containing prophylactic advice to all people who have the power to help in forming, deforming, or influencing other personalities,—in the first place parents and older siblings, teachers, employers, etc. G. S.

Feigl, Herbert. Logical analysis of the psycho-physical problem. A contribution of the new positivism. *Philosophy of science* 1, 420-45, 1934. ISIS

Flugel, J. C. A hundred years of psychology, 1833-1933. 384 p. New York, MACMILLAN, 1933 ($3.75). ISIS

The youngest of the biological sciences now claims a century of progress, though much of the advance has been made within the last three decades. The author, assistant professor in the University College, London, is very modest in his appraisal both of his science and its history. Nevertheless, his book is an excellent epitome of the rapidly shifting scene in the field of psychology since WOLFF, two centuries ago, wrote his *Rational psychology*. The work falls into four parts. The first deals with this science in 1833 when HERBART was striving for the recognition of psychology as a science, when the physiology of the sense organs was being investigated and theories of sensation were being formulated, and when phrenology and mesmerism were intriguing the popular mind. Part II (1833-1860) traces the rise of systematic psychology at the hands of J. S. MILL, BAIN, LOTZE, and the advances in the physiological aspects of the science by JOHANNES MÜLLER, HELMHOLTZ, FECHNER, and WEBER. During this period a better knowledge of hypnotism and abnormal psychology was developed by ELLIOTSON, ESDAILE, and BRAID. Part III (1860-1880) covers the period in which the concept of organic evolution as developed by DARWIN and SPENCER was applied directly to the human mind and psychology was accordingly expanded to include the comparative field of animal psychology. GALTON's work added the evolutionary concepts of variation and heredity as relative to the individual mind. The broadening effect of the evolutionary concept is also seen in the rise of child and social psychology. This period saw the writing of the great text books of JAMES and WUNDT, the rise of experimental psychology and the expansion of the European movement into America. Part IV (1900-1933) treats of the rise of the divergent schools of structural and functional psychology, configurationism, behaviourism, hormic, and type psychology, Freudianism, psycho-analysis, mental tests, and the factor school. The book closes with discussions of the relations of psychology to anthropology and sociology and its applications in education and industry. The treatment is critical, judicious, and both comprehensive and comprehending. C. A. K.

Hartshorne, Charles. The parallel development of method in physics and psychology. *Philosophy of science* 1, 446-59, 1934. ISIS

Jordan, Hermann. Gehirn und Seele. *Sudhoffs Archiv für Geschichte der Medizin* 27, 250-66, 1934. ISIS

Kestner, Otto. Die Abhängigkeit der wissenschaftlichen Erkenntnis von der Eigenart unserer Sinnesorgane. *Sudhoffs Arch. für Geschichte der Med.* 27, 267-76, 1934. ISIS

Rashevsky, N. Physico-mathematical aspects of the Gestalt-Problem. *Philosophy of science* 1, 409-19, 4 fig., 1934. ISIS

Renqvist, Yrjö. Das Webersche Gesetz im Lichte der Wissenschaftslogik. *Sudhoffs Arch. für Geschichte der Medizin* 27, 243-49, 4 fig., 1934. ISIS

"Zur Aufklärung der Bedeutung des Weberschen Gesetzes und auch anderer in der Sinnesphysiologie gefundener Regelmässigkeiten, z.B. der Regeln über die absoluten Schwellen, haben wir in den letzten Jahren ein neues Hilfsmittel erhalten : die logische oder logistische Analyse der Begriffe und des Messens. Im folgenden soll versucht werden, diese Analyse auf den klassischen, quantitativen sinnesphysiologischen Versuch anzuwenden."

Royce, Josiah. Lineamenti di psicologia. Traduzione e prefazione a cura di UMBERTO FORTI. XX+327 p. BARI, LATERZA & Figli, 1928. ISIS

38. — ARCHAEOLOGY
(*Generalities, methods*)

Mesnil du Buisson, Comte du. La technique des fouilles archéologiques. Les principes généraux. 256 p., 8 pl. Paris, GEUTHNER, 1934. ISIS

Ouvrage fort bien pensé et fort bien écrit et qui résume clairement les résultats d'une longue expérience. Nous nous intéressons beaucoup à ce sujet qui établit une communication entre l'histoire et la science pareille à celle que nous sommes en train d'édifier nous-mêmes. La technique des fouilles " désintéressées " est une acquisition relativement récente, plus récente même que la technique de nos propres recherches. Il est intéressant de noter que lorsque l'auteur a voulu énoncer les principes de cette discipline nouvelle il a pris pour guide l'*Introduction à la médecine expérimentale* de CLAUDE BERNARD. Il est fâcheux qu'il n'ait pas tenu compte des efforts faits par les archéologues étrangers, par ex. ceux du savant américain GEORGE ANDREW REISNER qui est l'un des maîtres de l'archéologie scientifique et a fait école. Le sous titre de l'ouvrage est inexact, car il ne s'occupe pas seulement de " principes généraux " mais de détails même infimes et d'ailleurs fort importants. Tout apprenti archéologue devrait étudier ce livre avant d'arriver à pied d'œuvre, le consulter souvent pendant son travail, et le réétudier après une année ou deux d'expérience. G. SARTON.

39. — PREHISTORY

Bologa, V. L.; Lenghel, Alex. Fragments pour la reconstitution de la médecine et de l'hygiène populaire en Dacie préromane. (In Rumanian with French and German summaries). Extras din *Clujul Medical*, no. 7, 24 p., 8 fig., 1930. ISIS

Le Tessier, Dr. Un médecin de la Vallée de l'Ain à l'époque aurignacienne. *Bull. de la soc. franç. d'hist. de la méd.* 28, 70-74, 1934. ISIS

MacCurdy, George Grant. New light on prehistoric man in Asia. *Proceedings of the American Philosophical Society* 74, 185-91, 6 pl., 1934. ISIS

(Prehistory, congress I). Proceedings of the first international congress of prehistoric and protohistoric sciences. London, August 1-6, 1932. IV+322 p. London, Oxford Univ. Press, 1934. ISIS

Reviewed in *Nature* 134, 613, 1934.

40. — ETHNOLOGY
(Primitive and popular science)

Andersson, Johan Gunnar. Hunting magic in the animal style. *The Bulletin of the Museum of Far Eastern Antiquities*, no. 4, 221-317, 36 pl., Stockholm, 1932. ISIS

Study of the symbolism of the Ordos bronzes of which an enormous collection (more than 2,000 pieces) is kept in the Museum of Far Eastern Antiquities of Stockholm. (It was my privilege to examine a part of that collection on July 30, 1934). G. S.

Bologa, Valeriu L. Organe und Körpersäfte in der rumänischen Volksmedizin. *Knoll's Mitteilungen für Ärzte*, 4 p., Oktober 1930. ISIS

Ceremonia supersticiosa que usan los Indios para curar enfermedades año de 1661. *Archivos de Historia Médica de Venezuela* 1, 131-32, 1934. ISIS

Dixon, Roland B. The long voyages of the Polynesians. *Proceedings of the American Philosophical Society* 74, 167-75, 1934. ISIS

" To assert the practical certainty of at least one voyage by Polynesians from the eastern margin of their area to the Peruvian coast, is but to raise a multitude of questions and problems that cannot here be discussed. Some

are practical, such as the difficulty of the return voyage from America to the homeland, for it is one thing to sail eastward and strike a continent, and quite a different one to sail thence westward and find again a single tiny island. Also there is the problem of the character of the reception such strange visitors would be likely to get at the hands of the highly cultured and warlike people who occupied the Peruvian shores. Some of the problems on the other hand are more theoretical, and involve us in keenly disputed questions of cultural diffusion on a large scale from the Oceanic region to the South American area, and the failure of the Polynesian visitors to bring back with them other items of South American culture beside the single one of the sweet potato. That the Polynesians were capable of reaching the New World shores and doubtless did so on a very few occasions, seems to be established. It remains for competent students to study minutely and critically the many problems thus raised, in order that they may be solved soundly and rationally, rather than as has so often been the case, guessed at by enthusiastic but reckless theorizers."

Marett, R. R. Sacraments of simple folk. 230 p. New York, Oxford University Press, 1933. ISIS

Reviewed by ROBERT H. LOWIE, *Isis* 21, 336, 1934.

Molinéry, Dr. Folklore médical en Gascogne. L'énigme du Tuco de Lahas. *Bull. de la soc. franç. d'hist. de la méd.* 28, 47-52, 1934. ISIS

Rickard, T. A. Drift iron. A fortuitous factor in primitive culture. *Geographical Review* 24, 525-43, 1934. ISIS

"To many primitive peoples in parts of the world remote from what we consider the centers of civilization the first man-smelted iron came in the form of nails in driftwood or of bands and hoops in wreckage from the ships of unfortunate European navigators. As soon as the era of exploration eastward and westward began at the close of the fifteenth century the wreckage of ships was cast upon the shores of the seven seas." "The world-wide distribution of iron by accident of wind and wave is a phase of metal usage that the student of cultural distribution must not ignore. The assumption that a piece of iron found, for example, in a prehistoric grave or in a remote part of the world came to the indigenes of the particular region by trade with more civilized peoples, such as those of Europe, may prove an error and the source of much profitless speculation."

Stone, Eric. Medicine among the Iroquois. *Annals of medical history* 6, 529-39, 6 fig., 1934. ISIS

41. — SUPERSTITION AND OCCULTISM

Bologa, Valeriu L.; Dima, L. A propos de quelques patrons de

maladies et de certains saints guérisseurs de la religion gréco-orientale. Communiqués KNOLL pour Médecins, 9 p., 7 fig., mars 1934. ISIS

Van Andel, M. A. De heks en de volksgeneeskunst. *Bijdragen tot de geschiedenis der geneeskunde* 14, 123-44, 1934. ISIS

43. — SOCIOLOGY, JURISPRUDENCE AND POSITIVE POLITY

Mayer, Joseph. Scientific method and social science. *Philosophy of science* 1, 338-50, 1934. ISIS

Sand, René. L'économie humaine par la médecine sociale. Préface de M. EDOUARD HERRIOT. VII+305 p. Paris, RIEDER, 1934. (25 fr.). ISIS

Nous avons analysé naguère un autre ouvrage de même auteur intitulé *L'organisation industrielle la médecine sociale et l'éducation civique en Angleterre et aux États Unis* (Paris, 1920; *Isis* 4, 122). Le présent ouvrage est une mise au point admirable d'un des sujets les plus importants et les plus urgents et plus proche du nôtre qu'il ne semble à première vue. Car le but suprême du Dr. SAND c'est d'humaniser la vie — de remplacer l'économie des biens matériels, étrangère au devoir social, antagoniste parfois de l'intérêt général, par une économie humaine —, et notre but à nous, c'est d'humaniser la science. Il est clair que nos actions sont convergentes. Cet ouvrage servira aussi à combattre le pessimisme social causé par la crise et aussi injustifié dans son intensité que l'optimisme des années de prospérité (*Isis* 21, 497). J'espère bien avoir l'occasion d'en reparler. G. S.

44. — HISTORY OF CIVILIZATION

(General history, historical methods, biography, and chronology)

Berr, Henri. Le vocabulaire historique du Centre international de synthèse. 4 p. Deuxième congrès national des sciences historiques (14-16 avril 1930), ALGER 1932. ISIS

Bing, Gertrud. The Warburg Institute. *The Library Association Record* 6 p., 1934. ISIS

Description of the Warburg Institute and Library previously established in Hamburg, now at Thames House, Westminster, London. It was my privilege to visit it in Sept. 1934, and I much admired its organization. The scope is " the tracing of Greek and Roman tradition in post-classical civilization." G. S.

Cournot, Antoine Augustin (1801-77). Considérations sur la marche

des idées et des événements dans les temps modernes. 2 vol. XXIV+354 p.+376 p. Paris, BOIVIN, 1934. ISIS

Réimpression, précédée d'une courte introduction de F. MENTRÉ, du seul des ouvrages philosophiques de COURNOT, qui n'ait pas été réimprimé depuis sa publication, 1872.

45. — HISTORY OF ART

(*Art and science, Iconography. Arts and crafts*)

Warburg, A. Die Erneuerung der heidnischen Antike. Kulturwissenschaftliche Beiträge zur Geschichte der europäischen Renaissance. Mit einem Anhang unveröffentlichter Zusätze. (Gesammelte Schriften Bde. I u. II, unter Mitarbeit von FRITZ ROUGEMONT, hrsg. von GERTRUD BING). 2 vols.: XX+725 p., 96 pl. Leipzig, TEUBNER, 1932. ISIS

An imposing series of essays magnificently illustrated. A few of these essays of special interest to our readers are classified in this bibliography each in its proper place. The Warburg Institute and Library founded and established in Hamburg for the promotion of similar studies, have now been moved to London, (3 Thames House, Millbank, S.W.1). Our every good wish to the Warburg community. G. S.

46. — HISTORY OF LANGUAGE, WRITING AND LITERATURE

Eastman, Max. Literature in an age of science (Address at the awarding of the AVERY HOPWOOD prizes at the University of Michigan, June 1934). *Michigan Alumnus*, 40, 108-16, 1934. ISIS

49. — HISTORY OF RELIGION

(*Science and religion*)

Hooykaas, R. Natuurwetenschap en religie in het licht der historie. Referaat voor de negentiende Wetenschappelijke samenkomst der Vrije Universiteit, 31 p., Assen, G. F. HUMMELEN, 1934. ISIS

McDougall, William. Religion and the sciences of life: with other essays on allied topics. XIV+263 p. London, METHUEN, 1934. ISIS

Reviewed by F. S. MARVIN, *Nature* 134, 7-8, 1934.

The Mount Sinai manuscript of the Bible. With four illustrations. Third edition. 22 p., pl. London, British Museum, 1934. ISIS

Ricci, Seymour de. La méthode comparative dans l'histoire des religions et l'œuvre de SALOMON REINACH. *Revue de l'histoire des religions* 110, 5-28, 1934. ISIS

VII. — MEDICINE

50. — HISTORY, ORGANIZATION, AND PHILOSOPHY OF MEDICINE

Bologa, Valeriu L. Les débuts de la liter. balnéol. en Transylvanie. (In Rumanian). Extras din Darea de Seamă asupra Adunării Generale extraordinare a Societății de Hidrologie și Climatologie medicale din România, 6 p. (no date). ISIS

Bologa, Valeriu L. Contributions à l'histoire de la médecine en Transylvanie. (In Rumanian). 102 p. (Universitatea din Cluj, *Biblioteca medico-istorică*, II). Cluj, ARDEALUL, 1927. ISIS

Sommaire français de 6 p. 1. Quatre siècles de médecine transylvaine; 2. Les premiers médecins roumains et les premières publications médicales roumaines en Transylvanie; 3. Histoire médicale de la ville de Brachov.

Bologa, Valeriu L. Les débuts de la lit. baln. roumaine. (In Rumanian). Extras din *Clujul Medical* no. 9, 6 p.; 1928. ISIS

Bologa, Valeriu L. Esquisses balnéo-historiques. 1. La balnéothérapie de la syphilis. Extras din *Clujul Medical* no. 4, 7 p., 1928. ISIS

Bologa, Valeriu L. Reichsdeutsche Ärzte im vorhabsburgischen Siebenbürgen. *Knoll's Mitteilungen für Ärzte*, H. 4, 6 p., 1928. ISIS

Bologa, Valeriu L. Siebenbürgisch-sächsische Ärzte des 16. und 17. Jahrhunderts. *E Mundo Medici, Mitteilungen für Ärzte*, no. 3, 16-20, 1928. ISIS

Bologa, Valeriu L. Les médecins macédo-roumains dans la monarchie des Habsbourg. (In Rumanian). Extras din *Inchinare lui N. Iorga cu prilejul împlinirii vârstei de 60 de ani*, 11 p., Cluj, 1931. ISIS

Bologa, Valeriu L. Mémoire sur l'insuffissance du local de l'Institut médico-historique de Cluj (in Rumanian). x p., Cluj, 1931. ISIS

Bologa, Valeriu L. Les influences occidentales dans la formation de la médecine scientifique roumaine. *Revue médicale roumaine*, no. 2, 7 p., 1932. ISIS

Bologa, Valeriu L. Institutul de istoria medicinei, farmaciei şi de folklor medical din Cluj, Extras din *Revista Boabe de Grâu*, no. 6, 21 p., illus., Junie 1932. ISIS

Bologa, Valeriu L. La crise de la médecine et la synthèse historique. Extras din *Clujul Medical* no. 11, 8 p., 1933. ISIS

En roumain avec résumé français : " Jamais le médecin n'a été aussi désorienté qu'aujourd'hui si on le met devant le problème de la définition de l'essence même de la vie et de la maladie. Aujourd'hui nous oscillons de nouveau entre la doctrine des humeurs et le solidisme, entre la pensée anatomique et fonctionnelle, entre le localisme morphologique et la conception constitutionnelle. Le problème corps et âme est aujourd'hui continuellement discuté. Nous sommes sur le point de passer de la conception médicale individualiste et thérapeutique à la conception collectiviste et prophylactique. Nous luttons d'instinct contre la spécialisation exagérée; cependant, nous ne trouvons pas encore la bonne voie pour reconstruire la personnalité synthétique du médecin. Nous désirons que la médecine demeure dans une unité idéale, qu'elle ne se perde pas dans les détails, mais nous ne trouvons pas encore les moyens de parvenir à une idée fondamentale de philosophie médicale, qui nous conduise à une synthèse. Des détails qui changent sans cesse entravent notre pensée de telle sorte que nous perdons de plus en plus de vue les grandes lignes évolutives de la médecine. C'est ici le point où peut intervenir de façon salutaire la pensée historique, et par conséquent philosophique en médecine. En revivant l'histoire de la médecine, nous pouvons distinguer ce qui a toujours été fondamental, ce qui constitue l'essence même de la pensée médicale, ce qui a toujours été, ce qui doit être et ce que restera toujours la personnalité du médecin. Elle nous montre le caractère pragmatique de la médecine, en contraste avec les sciences naturelles; elle nous apprend à comprendre que toujours, aux grandes époques de la médecine, l'objet principal n'a pas été un classement taxonomique des maladies (qui peut varier selon la mode), mais la pénétration du médecin dans la personnalité du malade. Par la synthèse historique, le médecin moderne, perdu dans les détails, peut être ramené à la pensée philosophique. Avec l'aide de l'histoire de la médecine, nous voulons lui donner la possibilité de considérer d'un point de vue plus élevé les problèmes actuels. L'histoire de la médecine est une source vivante où le médecin de nos jours peut trouver une nouvelle orientation morale, et surtout doctrinaire."

Bologa, Valeriu ; Mateescu, V. G. Noul Hipocratism. (Note pe marginea cărţii profesorului ARTURO CASTIGLIONI " l'orientamento neoippocratico del pensiero medico contemporanea". Torino, 1933, 51 p. Extras din *Clujul Medical* no. 7, 12 p., 1934. ISIS

Brooke, Helen C. An exhibit illustrating the history of pathology.

Bulletin of the Institute of the History of Medicine 2, 447-76, 9 pl., 1934. ISIS

Castiglioni, Arturo. Neo-Hippocratic tendency of contemporary medical thought. *Medical life* 41, 115-46, 9 illus., 1934. ISIS

Contents: 1. Inadequacy of medical systems; 2. The renaissance of function; 3. Transformation of scientific thought; 4. Synthetical unitary cosmic tendency; 5. The return to Hippocratism; 6. Humoral pathology; 7. The healing power of nature; 8. The practice of art.

Castiglioni, Arturo. Storia della medicina. *Enciclopedia italiana* 22, 703-27, Milan, 1934. ISIS

Costa, J. da Providência. Catálogo dos livros de medicina dos sécs. XV e XVI expostos por ocasião do III Congresso internacional de historia das ciências. *Bolitim da biblioteca geral da Universidade de Coimbra*, suplemento ao vol. XI, VI+64 p. Coimbra, 1934. ISIS

With preface by Professor ALBERTO PESSOA, who was general secretary to the congress. G. S.

Creutz, Walter. Die Neurologie des 1.-7. Jahrhunderts n. Chr. Eine historisch-neurologische Studie. 106 p. (Sammlung psychiatrischer und neurologischer Einzeldarstellungen, 6). Leipzig, THIEME, 1934. (M. 7.80). ISIS

This booklet deals with the neurological content of the writings of CELSUS, SORANOS, GALEN, ARETAIOS, KASSIOS, OREIBASIOS, AETIOS, ALEXANDER OF TRALLEIS, and PAULOS OF AIGINA. Translations of the neurological parts of the respective texts of all but GALEN are included. The ideas about the anatomical and physiological knowledge concerning the brain, spinal cord, and peripheral nervous system exhibited in these writings are critically discussed, and the pathological and clinical concepts revealed therein are summarized with regard to general neural symptomology, motor and sensory paralysis, facial convulsions, sciatica, lumbago, apoplexy, atrophy of the brain, and epilepsy. The summit of attainment in the first seven centuries of the Christian era was attained in the field of neurological anatomy and physiology in the second century by GALEN, while in the clinical field of nervous diseases the highest levels were attained in the 4th-5th century by SORANOS, the Numidian, who practised in Rome. His work, known through the writings of CAELIUS AURELIANUS, reveals marvellous minutiae of symptoms in the picture of disease, a refinement of differential diagnosis, and a discreet therapy. These high levels of attainment remained unsurpassed for a millenium. C. A. K.

Deetjen, Christian. Witchcraft and medicine. *Bulletin of the Institute of the History of Medicine* 2, 164-75, 1 ills., 1934. ISIS

De Lint, J. G. Openingsrede voor de geneeskundige afdeeling van het natuurwetenschappelijk museum te Leiden op 28 April 1934. *Bijdragen tot de geschiedenis der geneeskunde* 14, 118-22, 1 pl., 1934. ISIS

Englert, Ludwig. Anfänge des Bewusstseins einer deutschen Medizin. *Deutsches Ärzteblatt* 26, 16 p., 1934. ISIS

Garrison, Fielding H. The medical and scientific periodicals of the 17th and 18th centuries. With a revised catalogue and check-list. *Bulletin of the Institute of the History of Medicine* 2, 285-343, 1934. ISIS

Guiart, Jules. Institutul de istoria medicinei din Cluj in 1925-1927 (Fragment din lecția de istoria medicinei, ținută in 24 Martie 1927 in sala Bibliotecii Universitătii din Cluj). Extras din *Clujul Medical* no. 10, 8 p., Octombrie 1927. ISIS

Heischkel, E. Die Strasse in der Geschichte der Medizin. *Technikgeschichte* 23, 9 p., 2 fig., 1934. ISIS

Himes, Norman E. Medical history of contraception. *New England Journal of Medicine* 210, 576-81, 1934. ISIS

Hume, Edgar Erskine. Spanish colonial medicine. *Bulletin of the Institute of the History of Medicine* 2, 215-30, 1934. ISIS

Major, Ralph H. History of the stomach tube. *Annals of medical history* 6, 500-09, 8 fig., 1934. ISIS

Moll, A. A. Physicians in public life, especially in Latin America. *Bulletin of the Institute of the History of Medicine* 2, 231-48, 1934. ISIS

Nițulescu-Bologa, Valeria. Institutul de istoria medicinei și farmaciei și de folklor medical din Cluj. Extras din no. 1 a *Revistei Viața Medicală*, 4 p., 1929. ISIS

Opuscula selecta Neerlandicorum de arte medica. Fasciculus duodecimus quem curatores miscellaneorum quae vocantur Nederlandsch Tijdschrift voor Geneeskunde collegerunt et ediderunt. XXXII+383 p., 5 port. Amstelodami, Sumptibus Societatis, 1934. ISIS

This volume is devoted to fifteen Dutch obstetrical writings of the second

half of the eighteenth and the first half of the nineteenth century and the authors represented are: P. CAMPER, A. BONN, G. R. F. GROSHANS, J. P. MICHELL, C. BLEULAND, D. HASSELMAN, J. VAN MUNSTER, G. J. VAN WIJ, G. SALOMON, A. HALDER, J. BAL, P. J. VAN WAGENINGE. An introduction of 26 p. was provided by F. M. G. DE FEYFER. The articles are all in Dutch and untranslated. G. S.

Riesman, David. Men and events in the history of the Philadelphia pathological society. *Annals of medical history* 6, 359-75, 1934. ISIS

Rodríguez-Rivero, P. D. Archivos de historia medica de Venezuela. Año 1, no. 2, 25-48. Administrador: Br. P. D. RODRIGUEZ-MAGGI, Cooperativa de artes graficas, Caracas, 1934. ISIS

We take great pleasure in announcing the publication of this new journal of medical history, devoted to the medical history of Venezuela. This second number (we have not seen the first) deals with Venezuelian medical history in the seventeenth, eighteenth and nineteenth centuries, and is entirely written by its director, Dr. P. D. RODRIGUEZ-RIVERO. Our every good wish to him and his *Archivos*. G. S.

Sigerist, Henry E. Man and medicine. An introduction to medical knowledge. Translated by MARGARET GALT BOISE. Introduction by WILLIAM H. WELCH. x+340 p. New York, NORTON, 1932.

Reviewed by S. V. LARKEY, *Isis* 21, 337-38, 1934. ISIS

Spector, Benjamin. One hour of medical history. Volume 3. xi+181 p., illus. Boston, Tufts College Medical School, 1934. ISIS

"The series of medical pageants, presented under the able direction of Dr. BENJAMIN SPECTOR by students of the Medical School of Tufts College, has established itself so securely as a unique and effective agency for arousing interest in medical history it is highly important and appropriate that the series should be continued and that each pageant should be preserved in printed form. Hence this book." Preface by HENRY E. SIGERIST. Elegant volume which will popularize SPECTOR's careful efforts for the diffusion of the history of medicine. However, I am afraid that scholars may be saddened by the thought that so much money was spent for a book adding nothing whatever to our knowledge, when so much is needed and often unobtainable for the publication of the results of research. G. S.

Van Andel, M. A. De Gevelsteen en de geneeskunst. *Bijdragen tot de geschiedenis der geneeskunde* 14, 155-59, 10 fig., 196-201, 8 pl., 1934. ISIS

Weinberger, Bernhard Wolf. Ancient dentistry in the old and new world. *Annals of medical history* 6, 264-79, 5 fig., 1934. ISIS

51. — EPIDEMIOLOGY, HISTORY OF SPECIAL DISEASES PUBLIC HEALTH AND SOCIAL MEDICINE

Chaumartin, Henry. Le feu Saint-Antoine et l'Angleterre à propos d'un sceau de l'Hôpital Antonin de Londres. *Bull. de la société franç. d'histoire de la médecine* 28, 228-34, 1934. ISIS

Diepgen, Paul. Die historischen Wurzeln des deutschen Gesundheitswesens und ihre Lehren. Zu ALFONS FISCHERS: Geschichte des deutschen Gesundheitswesens. *Deutsche medizinische Wochenschrift* 24, 10 p., 1934. ISIS

Elgood, C. The early history of the Baghdâd boil. An attempt to prove the existence of the disease in ancient times and to suggest the source from which it was imported into 'Irâq. *Journal of the Royal Asiatic Society* 519-33, 1934. ISIS

History of the Iraquian form of *Cutaneous Leishmaniasis*. Earliest reference to it in Arabic literature A.D. 991. G. S.

Essed, W. F. R. Syphilis en Framboesia. *Bijdragen tot de geschiedenis der geneeskunde* 14, 100, 1934. ISIS

Friedman, Reuben. The story of scabies. Written for the centenary of RENUCCI's re-discovery of the *Acarus scabiei*. *Medical life* 41, 381-424, 426-76, 1934 (to be cont'd). ISIS

Geschickter, Charles F. The early literature on chronic cystic mastitis. *Bulletin of the Institute of the History of Medicine* 2, 249-57, 2 fig., 1934. ISIS

Greene, Henry Copley. Shut out from the world. Leprosy, XIIth to XIVth centuries. *The history reference bulletin* (Civilization, science, letters, arts), 14 Kirkland Place, Cambridge, Mass. April 1934, 2 sections, no. 18, sec. I, 8 p.). ISIS

A valuable introduction to the subject with bibliography. G. S.

Guiart, Jules. La peste et les bureaux de santé. Extras din *Clujul Medical* no. 5, 2 p., fig., 1929. ISIS

Howard, Sidney. Yellow Jack. A history. In collaboration with PAUL DE KRUIF. XI+152 p., 4 pls. New York, HARCOURT, BRACE, 1934 ($2.00). ISIS

This play puts on the stage a scientific drama of international interest

for all time. It portrays the heroic work of Dr. WALTER REED, JESSE W. LAZEAR, and their volunteer assistants in Cuba in their experimental discovery of the agency of the mosquito in the transmission of the virus of yellow fever. Other scenes are in a London laboratory and in West Africa featuring Dr. ABRAM STOKES in his fatal laboratory at Lagos. This is apparently the first time that scientific discovery forms the main theme and central action of a drama. C. A. K.

Klebs, Arnold C. Bibliography of variolation. *Johns Hopkins Hospital Bull.* 24, 27 p., 1913. ISIS

Koopman, J. Iets uit de geschiedenis van den diabetes. *Bijdragen tot de geschiedenis der geneeskunde* 14, 81-91, 1934. ISIS

Laughlin, Robert Clark. Glaucoma, a historical essay. *Bulletin of Institute of the History of Medicine* 2, 141-63, 1934. ISIS

Nieuwenhuis, A. W. Körperliche und kulturelle Volksentartung in Gebieten endemischer Malaria. Mittel Sumatra. *Janus* 38, 121-36, 163-78, map, 1934 (to be cont'd). ISIS

Rodríguez-Rivero, P. D. El ganado vacuno y su papel sanitario. La leche de vaca, panacea. *Archivos de Historia Médica de Venezuela* 1, 126-30, 1934. ISIS

Zimmermann, Ernest L. The early pathology of syphilis, especially as revealed by accounts of autopsies on syphilitic corpses (1497-1563). *Janus* 38, 37-69, 1934. ISIS

52. — HISTORY OF HOSPITALS, OF MEDICAL TEACHING AND OF THE MEDICAL PROFESSION. BALNEOLOGY.

Bishop, W. J. Notes on the history of medical costume. *Annals of medical history* 6, 193-218, 6 fig., 1934. ISIS

Caldas da Rainha (Portugal). Eaux sulfureuses centre de tourisme d'art et d'histoire. 23 p,. illus. Tipografia Caldense Caldas da Rainha, Portugal, 1934. ISIS

Ferrari, António de Melo; Ferrari, Manuel de Melo; Correia, Fernando da Silva. O hospital termal das Caldas da Rainha. A sua história as suas águas as suas curas. XV+358 p., pl. Caldas da Rainha, 1930. ISIS

Fossier, A. E. History of medical education in New Orleans. From

its birth to the Civil War. *Annals of medical history* 6, 320-52, 8 fig.; 427-47, 3 figs., 1934. ISIS

Guiart, Jules. Histoire de la Faculté de médecine et de pharmacie de Cluj (Kolozsvar). *Le Progrès Médical* (supplément illustré) 10, 8 p., illus., 1933. ISIS

Hellinga, G. Sprokkelingen uit het gasthuisarchief. *Bijdragen tot de geschiedenis der geneeskunde* 14, 91-96, 1934. ISIS

Hoeven, J. van der. Het chirurgijns-gilde te Deventer. *Bijdragen tot de geschiedenis der geneeskunde* 14, 57-69, 1934. ISIS

Howell, William Boyman. L'hôtel-Dieu de Quebec. *Annals of medical history* 6, 396-409, 1934. ISIS

Paulo, Jorge de S. Historia da Rainha D. Leonor e da Fundação do hospital das Caldas. Escrito em 1656, editado em 1928. 209 p., illus. Lisbon, Tip. da Emprêsa Nacional de Publicidade, (no date). ISIS

Snuif, M. G. Uit de kinderjaren van de Maatschappij tot redding van drenkelingen. *Bijdragen tot de geschiedenis der geneeskunde* 14, 70-77, 1934. ISIS

Sudhoff, Karl. Die geschichtliche Entwicklung der Beziehungen zwischen ärztlichen Beruf und dem Krankenhause. *Nosokomeion* 2, 1-20, 1931. ISIS

53. — PHARMACY. PHARMACOLOGY. TOXICOLOGY

American Pharmaceutical Association. Dedication of the American Institute of Pharmacy, Washington, May 9, 1934. Ten o'clock A.M. ISIS

Kremers, Edward. Introductory lecture to a course in history of pharmacy. *Journ. A. Ph. A.*, Dec. 1933. ISIS

A lecture delivered by special request before the delegates attending the annual meeting of the American Association of Colleges of Pharmacy held in Madison, August, 1933. It was delivered in the special exhibit room of the Museum of the Wisconsin Historical Society in which there had been arranged an extensive exhibit of documents and other objects of historical interest. E. K.

Kremers, Edward. The old Northwest Territory and pharmaceutical

education. Pamphlet, Purdue University, Lafayette, Ind., 1934. ISIS

A convocation address delivered at the fiftieth anniversary of the Purdue School of Pharmacy, March 20, 1934, in which the influence of state universities on the older system of apprenticeship as fostered by the colleges of pharmacy is traced. E. K.

Kremers, Edward. Teaching of the history of pharmacy. *Isis* 21, 304, 1934. ISIS

Meyer, Minnie. The pharmaceutical journals of the United States. *Journ. A. Ph. A.*, May 1933. ISIS

After several attempts by others which cover the subject but imperfectly, the author has written a comprehensive bachelor's thesis (U.W. Library 1932) which includes a chronological list, an alphabetical list of titles, brief monographs on each journal, etc. Before undertaking a final revision, this geographic list was issued as a preliminary publication hoping that pharmaceutical representatives of the several states would suggest additions or any necessary corrections. The list is a formidable one. While relatively few journals are of what is commonly called permanent value, the entire collection will prove of inestimable value to the future historian of American pharmacy in tracing the commercialization that has taken place during the last generation, and the swinging back of the pendulum indicating a return to professional pharmacy now manifesting itself. E. K.

Mousson-Lanauze, Dr.; **Hariz,** Dr. A propos du venin du cobra. *Bull. de la soc. franç. d'hist. de la méd.* 28, 103-06, 1934. ISIS

Simili, Alessandro. Quando sorsero le iniezioni saline endovenose e ipodermiche? *Rivista di storia delle scienze mediche e naturali* 25, 123-43, 1934. ISIS

Wickersheimer, E. Documents pour servir à l'histoire de la profession d'apothicaire à Strasbourg. 12 p. (without indication of source or date; received in October 1934). ISIS

Contents: 1. La taxe des médicaments de 1625; 2. L'apothicaire, créancier privilégié; 3. Falsification du Quinquina, 1735; 4. Encore un mot sur la thériaque céleste, dite " de Strasbourg".

VIII. — EDUCATION

(The methods of accumulating, imparting and diffusing knowledge)

54. — EDUCATION

(*Generalities, methods, colleges, universities*)

Charléty, S. L'université de Paris, du moyen âge à nos jours. 223 p., ill. Paris. LAROUSSE, 1933. ISIS

Recueil de plans, chartes, monuments, portraits, etc., préfacé par S. CHARLÉTY, recteur de l'Université de Paris.

Tanfani, Gustavo. Gli antichi collegi degli scolari dello studio di Padova. *Atti della società italiana di storia delle scienze mediche e naturali*, IV. Congresso Nazionale, Rome, 200-10, 5 fig., 1933. ISIS

Woody, Thomas. A history of women's education in the United States. Vol. I, XVI+608 p., 70 fig.; vol. II, XII+646 p., 54 fig. New York, Science Press, 1929 ($10.00). ISIS

This encyclopedic history of the education of women in the United States is the fourth of 'A series of volumes for the promotion of scientific research and educational progress' edited by J. MCKEEN CATTELL. It covers a period of profound transformation of the relations to and opportunities for both education and scientific research for women in a country in which progress in both education for and research by women has been as great, if not greater, than elsewhere. Of scientific value in this history are the facts pertaining to the growth of facilities for education in the sciences, statistics of women as inventors, and in professional schools, including dentistry and medicine. There is a list of texts recommended for use in women's colleges showing a total of 516 books, 95 in the sciences. In 1920, there were 8,882 women physicians and surgeons in the U.S.A. and 141,125 men. The author has not adequately presented the subject of scientific research by women, though there is a history of the opening of graduate work to women and statistics of higher degrees granted women and men. Over one-third of all graduate students are women, and in 1910 there were 439 doctorates conferred on men to 93 on women. C. A. K.

55. — ACADEMIES, SOCIETIES, CONGRESSES. NATIONAL AND INTERNATIONAL ORGANIZATION OF SCIENCE

(*Societies and congresses devoted to particular sciences are classified under those sciences. For the internal organization of science*—ISIS I, 195—*see section* 17)

Dahlgren, E. W. Kungl. Svenska Vetenskapsakademien. Personförteckningar, 1739-1915. VII+295 p. Stockholm, ALMQVIST & WIKSELLS, 1915. ISIS

List of all the members, including the foreign ones, of the Swedish Academy of sciences from 1739 to 1915, with brief biographical notes. A very useful book. G. S.

56. — BIBLIOGRAPHY

(*Methods, libraries*)

Gilchrist, Donald B. Doctoral dissertations accepted by American

universities, 1933-1934. (Number 1) Compiled for the National Research Council and The American Council of Learned Societies by The Association of research libraries. XVI+88 p. New York, WILSON, 1934 ($1). ISIS

"All doctoral dissertations accepted by American universities during the past year, in a single list, was the objective of The Association of research libraries, in planning this publication. No list of similar scope has previously appeared for American dissertations, altho complete lists for French and German university dissertations have been published annually for many years. The fact that of the 2,630 dissertations comprising this list, only 966 were categorically required to be printed by the universities accepting them, and another 698 may or may not be printed either in full or in part, indicates the incompleteness of lists of printed theses. It is now almost a universal practice to file full manuscript theses in duplicate, and to make copies available thru interlibrary loan. For this reason the list fills a real and growing need to libraries."

Isis nos. 61 and 62 (vol. 21, 231-486, 4 pl., 30 fig.; 488-700) Bruges, 1934. ISIS

These numbers have been analyzed in the forty-second Critical Bibliography. Every previous number has been analyzed in previous bibliographies.
G. S.

58. — CATALOGUES OF SECOND-HAND BOOKS ON THE HISTORY AND PHILOSOPHY OF SCIENCE

L'Art ancien S. A. Short list 5, Early books. 68 p., 411 items. Zurich, 8 Pelikanstrasse, 1934. ISIS

Contents: Medicine and natural sciences, Occult sciences, Spanish books, Varia, Supplement.

Fock, Buchhandlung Gustav. Vertebrata, recentia—fossilia. Zum Teil aus der Bibliothek des Herrn Baron FRANZ VON NOPCSA, Budapest. Antiquariats-Katalog Nr. 694, 130 p., 3541 items. Leipzig C.1, 1934. ISIS

George, William. Catalogue of books on natural and physical sciences, including many interesting and scarce items. No. 419, 36 p., 1055 items. Bristol, 1, England, 89 Park St., 1934. ISIS

Contents: General; Agriculture and forestry; Anthropology and ethnology; Astronomy; Botany and gardening; Entomology; Evolution and heredity; Geology; Marine botany and zoology; Medical (including dentistry); Natural history; Nature study and country life; Ornithology; Zoology; Addenda.

Goldschmidt, E. P. Catalogue 34: Botany, herbals, chemistry, pharmacology, zoology. 37 p., 144 items, illus. London, W.1, 45 Old Bond Street (received June 1934). ISIS

Goldschmidt, E. P. Literature and history of the Middle Ages and of the XVth century. Ancient classics: music: drama. Catalogue 33. 49 p., 231 items, ills. London, W.1, 45 Old Bond Street (received May 1934). ISIS

Goldschmidt, E. P. Old books on the history of science. Catalogue no. 32. 33 p., 138 items, figs. London W.1, 45 Old Bond St. (received in 1934). ISIS

Goldschmidt, E. P. Scientific thought and discovery. Including first editions of AMPERE, BOYLE, TYCHO BRAHE, COPERNICUS, DAGUERRE, GALILEI, GROSSETESTE, HALLEY, HELMHOLTZ, HEVELIUS, HUYGENS, KEPLER, LAMARCK, LAVOISIER, LYELL, MALPIGHI, CUSA, PASTEUR, PECKHAM, PASCAL, TELESIUS, VOLTA. (Catalogue 35). 57 p., 200 items, 8 pl. London, W.1, 45 Old Bond St. (received in 1934). ISIS

Grafton & Co. De historia rerum. Books on the history of common and uncommon things. Catalogue 150, 28 p., 479 items. London, W.C.1, 51 Great Russell St. (no date, received in 1934). ISIS

Grafton & Co. Railways, 1734-1934. Two hundred years of railway literature. Books, pamphlets, maps, prints, a chronological list. Catalogue no. 146, 39 p., 522 items. Coptic House, London, W.C.1, 51 Great Russell St., 1934. ISIS

Halle, J. Alte Medizin, Katalog 75, 30 p., 443 items. München, Ottostrasse 3a (n.d., received Oct. 1934). ISIS

Harrassowitz, Otto. Indien, Teil II: Sanskrit-, Pali- und Prakrit-Literatur neuindische Sprachen. Bücher-Katalog 453, 241 p., 4007 items. Leipzig, Querstrasse 14, 1934. ISIS

Heffer, W. Reference catalogue of periodicals, journals and transactions of the learned societies, library editions and standard books in general literature, history, science and oriental, English and foreign. Catalogue no. 439, 166 p., 2989 items. Cambridge, England, 3 & 4 Petty Cury, 1934-35. ISIS

Heffer & Sons. Second-hand books including occult sciences, alchemy,

folk-lore, etc., including books and MSS. from the library of M. LIONEL HAUSER. Archaeology, art, bibliography, philosophy, theology, etc. No. 435. 58 p., 1418 items. Cambridge, 4 Petty Cury, 1934. ISIS

Karl & Faber. Inkunabeln Deutsche Literatur. Geschichte und Hilfswissenschaften Bibliographie. Auktion X, 104 p., 1000 items, figs. München, 2 NW, Karolinenplatz 1, 1934. ISIS

Kegan Paul, Trench, Trübner. Anthropology. A catalogue of books on the origins, customs, culture and beliefs of mankind. No. 27, 104 p., 1794 items. London W.C.1, 38, Great Russell St., 1934. ISIS

Leighton, Ltd., J. & J. Books on the history of medicine & the sciences including manuscripts and early printed books, Judaica, early English and Celtic medicine and magic, Arabica, Indica, Chinese and Japanese medicine, biology, chemistry, physiology, HIPPOCRATES, GALEN, ARISTOTLE, etc. Catalogue 25. 38 p., 334 items. London, W.C.1, 100 Great Russell St. Bloomsbury (received in Aug. 1934). ISIS

Lowe Bros. Catalogue of books including botany and gardening, early scientific, natural history, sports and pastimes, transport : railways, canals, and old road books. No. 1062, 36 p., 629 items, Birmingham, Eng., 15, Martineau St, 1934. ISIS

Nourry, Emile. Médecine ancienne : anatomie-chirurgie, chimie et alchimie, sciences anciennes, No. 53. 81 p., 898 items. Paris (V^e^), 62, Rue des Ecoles, 1933. ISIS

Quaritch, Bernard. A catalogue of books including Americana, Australiana, Bibles, liturgies, etc., bibliography & palaeography, early printed books, English literature, fine arts, natural history, oriental history & literature, periodicals and a small selection of works on tobacco. No. 493, 108 p., 708 items. London, W.1, 11 Grafton St. New Bond St., 1934. ISIS

Quaritch, Bernard. A catalogue of books & periodicals on aeronautics, astronomy, chemistry, electricity, engineering, fortification and gunnery, horology, mathematics, meteorology, mining and minerals, navigation, physics, pyrotechnics, surveying, etc. No. 489. 74 pl., 485 items. London, W.1, 11 Grafton St., New Bond St., 1934. ISIS

Quaritch, Bernard. A catalogue of books & periodicals of botany including a large number of important floras mostly from the library of the late CHARLES CARMICHAEL LACAITA. No. 492. 38 p., 396 items. London, W.1, 11 Grafton St., New Bond St., 1934. ISIS

Quaritch. A catalogue of books & periodicals on natural history including zoology, geology and palaeontology. No. 495, 160 p., 2004 items. London, W.1, 11 Grafton St., New Bond St., 1934. ISIS

Sotheran, Henry. Annotated catalogue of works on medicine, surgery and pharmacology. Medical series, no. 1, no. 841, 120 p., 1793 items. London, W.1, 43 Piccadilly, 1934. ISIS

Späth, August. Liste 25 : Alte Medizin — Balneologie mit Anhang : Alte Naturwissenschaften und Technik. 6 p., 94 items. München 2 No, Hildegardstrasse 28 (received April 1934). ISIS

Taeuber, H. W. (Antiquariat G.M.B.H.). Alte Pharmakologie Kräuterbücher. Liste 42, 48 p., 217 items, illus. München, Barerstrasse 22 (n.d., received Nov. 1934). ISIS

59. — MEMORIA TECHNICA

Critical bibliography no. 42, *Isis* vol. 23, 488-616, 1935. ISIS

This note is published at the end of our bibliography solely for the convenience of the scholars who cut out the whole or part of it, attach extracts to catalogue cards and classify them. By adding this note to the others they will be able to find rapidly whether this particular bibliography has been analyzed.

60. — ERRATA. Series 32

(*For previous errata, see* ISIS, 22, 613.)

Isis

" The readers are asked to disregard the *Avis aux lecteurs* printed on the sticker attached to the cover of No. 62. The quotation in *Isis* 21, 233, refers to SCHILLER's activities at Weimar, and deals with his modernization of LESSING's play."

Vol. 6, 73. Article COOMARASWAMY, l. 6 of text read vol. II instead of vol. III.

Vol. 9, 628. BORDEU, not BORDEUX.

Vol. 15, 387, l. 8. WILLIAM MADDOCK BAYLISS (1860-1924), not 1866.

Vol. 15, 556(bis). BORDEU not BORDEUX.

Vol. 23, 255 l. 23. Suppress the words " and CUSHING ".

Introduction to the History of Science

Vol. 2, 206. Note JĀBIR, l. 4. Read " middle of twelfth century," not thirteenth.

Vol. 2, 1205. MOSES B. NAḤMAN GERONDI (XIII-2), not (XIII-1).

A few other misprints are not mentioned in these *errata* because they are too obvious to cause any error or confusion. I wish to express my thankfulness to the readers who take the trouble to make the above-mentioned corrections in their sets of *Isis* and of the *Introduction*. I would advise them after having accomplished that little task, to write their initials near mine at the bottom of this note to indicate that these and the previous *errata* have been taken into account.

These and the previous *errata* have been corrected by... G. S.

Index of Authors Included in the Forty-Second Bibliography

The Roman figures followed by (1) or (2) refer to the centurial classification (Part I). Thus, Anspach, C. K., XVII(2)D means that a paper by Anspach, C. K. is listed under seventeenth century, second half, subdivision D.

The Arabic figures refer to the historical and to the systematic classifications (Part II and III) which are subdivided into sections numbered consecutively from 1 to 60. For instance, Diepgen, P., 4, 51, indicates that papers by Diepgen are listed in section 4 (Greece), and in section 51 (Epidemiology).

December 1934. FRANCES SIEGEL.

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